

EXPIRED LICENSE

To : Division of Inspection, Headquarters

Date: September 3, 1959

From : Inspection Division, San Francisco Operations Office  
U.S. Naval Radiological

SUBJECT : EXPIRED LICENSE Defense Laboratory San Francisco

Name  
4-487-5, 10 CFR 30  
License Number

Address

Attention:

The records of this office show that the above identified license expired on  
December 31, 1958

Month Day Year

The files of this office also show that the Division of Licensing and Regulation has dispatched letters to the licensee as follows:

First notice (no letters received)  
Date and Form Number

Second notice  
Date and Form Number

Other No notices necessary - Project has been completed.

(b) (6)

It is requested that the following information be obtained from the Division of Licensing and Regulation and be furnished this office:

(a) Has a timely application for renewal been filed? Yes No  
(circle)

If "yes" please indicate the date of filing  
Month Day Year

(b) If licensee has not filed a timely application for renewal, has he submitted a certificate of nonpossession? Yes No  
(circle)

If "yes" please furnish copy of certificate with this form when returned to INS.

(c) Has DLR taken any licensing action which supersedes or otherwise extends the above-named license or the program covered by this letter? Yes No  
(circle)

If "yes" please furnish type and date of action, including name of licensee, license number and date of license as appropriate.

(Use reverse side for additional space if needed.)

Rec'd from Field 9/8/59  
Date

Sent to DLR by INS 9/9/59  
Date

Returned to INS by DLR 9/16/59  
Date

Rec'd from DLR  
Date

Sent to Field  
Date

(Submit an original and two)



Date Rec. Jul 2 1958Exp. Date 12/31/58Issue Date 8/4/58Tech. Rev. (b) (6)Control  
No.

11540

Ref.  
No.License  
No.

4-487-5 L58

Amend.  
No.

Isotope

A. LA-140

B.

C.

D.

E.

F.

G.

H.

Form

A. Any

B.

C.

D.

E.

F.

G.

H.

Possession Limit

A. 500 curies

B.

C.

D.

E.

F.

G.

H.

Authorized Use

A. To be used as a tracer in decontamination studies.

SCHA Review

Yes ☐No ☐

Type User (Circle One) 1 2 3 4 5 6 7 Other

Mail To

(b) (6)

Date Mailed

Remarks, letters, phone calls, visits, exemptions, etc.  
(use reverse side if necessary)

1. Briefly discussed with (b) (6) 7/17

2. Called (b) (6) 7/17, advised completion date to 8/15

3. Called (b) (6) 8/1, he advised me that exposure  
has to be within 10-15 R-20.

(b) (6)

Conditions

1. A B C 9. A2. A B C 10.3. A B C D 11.4. A B 12.

5. 13.

6. 14.

7. 15.

8. A B C 16.Approve ☐

Tech.

Rev. (b) (6)

Chief

(b) (6)



U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO 24, CALIFORNIA

IN REPLY REFER  
TO FILE:

901-850  
730-77  
WJF:tmd  
FO-23

23 JUL 1959

U. S. Atomic Energy Commission  
Isotopes Branch  
Division of Licensing and Inspection  
1717 H Street N. W.  
Washington 25, D. C.

Gentlemen:

In accordance with the provisions of By-Product Material License No. 4-487-5 (L58), dated August 4, 1958, the U. S. Naval Radiological Defense Laboratory, conducted a controlled laboratory decontamination project entitled "Development of Reclamation Procedures for Land Targets" at Camp Stoneman, California, during the summer of 1958.

Radiological safety controls for this operation were provided by a Health Physicist and supporting Rad-Safe unit. Data compiled and evaluated on the rad-safe aspects of this operation have been documented and published, as USNEDL-TM-111, "Radiological Safety Report, Operation Stoneman II," by (b) (6) Radiological Development Branch, Health Physics Division.

A copy of this report is enclosed for your information and records.

(b) (6)

Associate Scientific Director  
By direction of the Commanding Officer and Director

Encl: (1) Copy of Tech Memo 111



6819

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO 24, CALIFORNIA

IN REPLY REFER  
TO FILE:

901-850

730-77

WJF:tmd

FO-23

28 JUL 1959

U. S. Atomic Energy Commission  
Isotopes Branch  
Division of Licensing and Inspection  
1717 H Street N. W.  
Washington 25, D. C.

Gentlemen:

In accordance with the provisions of By-Product Material License No. 4-487-5 (158), dated August 4, 1958, the U. S. Naval Radiological Defense Laboratory, conducted a controlled laboratory decontamination project entitled "Development of Reclamation Procedures for Land Targets" at Camp Stoneman, California, during the summer of 1958.

Radiological safety controls for this operation were provided by a Health Physicist and supporting Rad-Safe unit. Data compiled and evaluated on the rad-safe aspects of this operation have been documented and published, as USNRDL-TM-111, "Radiological Safety Report, Operation Stoneman II," by (b) (6), Radiological Development Branch, Health Physics Division.

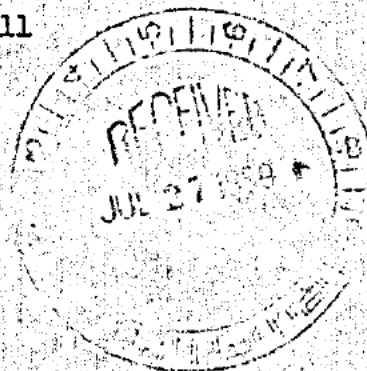
A copy of this report is enclosed for your information and records.

(b) (6)

Associate Scientific Director

By direction of the Commanding Officer and Director

Encl: (1) Copy of Tech Memo 111





U. S. ATOMIC ENERGY COMMISSION  
BYPRODUCT MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee		
1. Name <b>U. S. Naval Radiological Defense Laboratory</b>		3. License number <b>DA-487-5 (158) INSP.</b>
2. Address <b>Scientific Department San Francisco 24, California</b>		
		4. Expiration date <b>December 31, 1958</b>
		5. Reference No.
6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
<b>Lanthanum 140</b>	<b>Any</b>	<b>500 curies</b>

## 9. Authorized use

To be used as a tracer in decontamination studies.

## CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.
11. Byproduct material may also be used at Camp Stoneman, Pittsburg, California.
12. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation".
13. Byproduct material shall be used by, or under the direct supervision of,  
**(b) (6)**
14. The licensee shall possess and use byproduct material in accordance with the procedures represented in his application dated May 26, 1958, and as amended by:
  - A. Letter dated May 23, 1958, from the U. S. Naval Radiological Defense Laboratory, San Francisco 24, California, to URBEC with attached abstracts entitled: "Development of Reclamation Procedures for Land Targets" and "Radiological Safety Measures for Land Target Reclamation Study."

(See page 2)

For the U. S. Atomic Energy Commission  
Original Signed By

**(b) (6)**

by **Chief, Isotopes Branch**  
Division of Licensing and Regulation  
Washington 25, D. C.

Date **August 4, 1958**

**(b) (6)**



U. S. ATOMIC ENERGY COMMISSION  
BYPRODUCT MATERIAL LICENSEPage 2 of 2 Pages

Supplementary Sheet

License Number 4-487-5  
(158)CONDITIONS - Continued:14. - Continued:

- B. Letter dated July 1, 1958, from the Department of the Navy, Bureau of Ships, Washington 25, D. C., to USAEC.
- C. Letter dated July 22, 1958, from the Department of the Navy, Bureau of Medicine and Surgery, Washington 25, D. C., to USAEC, with attached BuMed letter - Serial 5123 with 1st and 2nd endorsements.

For the U. S. Atomic Energy Commission

Original Signed By

(b) (6)

Date August 4, 1958by Chief, Isotopes BranchDivision of Licensing and Regulation  
Washington 25, D. C.

(b) (6)



TELEPHONE CALL AUGUST 1, 1958 to:

Re: Control No. 11540

Mr. (b) (6) MISSION 8-6900  
Chairman, Radioisotope Committee  
U. S. Naval Radiological Defense Lab.  
San Francisco 24, California

Call was made to give Beletti a License Number for the USNRDL La-140 decontamination studies provided the exposure limits were to be within Part 20 limits.

(b) (6) seemed to think he had specifically covered this in the application and became a bit perturbed when I indicated that his proposed 15 rad whole body La-140 beta exposure was outside 10-CFR-20 limits. I stated that since we did not agree that his limits were within Part 20, the application would be held up until we received concurrence from AEC's Division of Biology and Medicine. (b) (6) expressed his dissatisfaction with the time already elapsed (his application dated May 26 was received July 2) since he submitted the application. He repeated that whether we considered his exposure limits within Part 20 or outside Part 20, he felt them acceptable and wanted them evaluated as presented in the application.

In view of the questions presented by exposure limits, the License Number was not supplied to Mr. (b) (6).

During the above telephone conversation, I was under what now appears to be a mistaken impression that La-140 betas would have a half value layer of over 1 mm tissue. More exact calculations based on a formula from Libby's article in Physical Review, Volume 103 (1956) Page 1900-01 indicates a weighted La-140 beta half value layer to be about 70 mg/cm<sup>2</sup> or 0.7 mm. It is to be noted that Hb 59 indicates the lens of the eye may be assumed to be at an average depth of 3 mm and tests at 1 cm., while the basal layer of the epidermis may be assumed located at 7 mg/cm<sup>2</sup>, it then appears that his beta dose to the basal layer of epidermis may be the limiting factor and not the beta eye or gonadal dose. However, Part 20 appears to depart from Hb 59 recommendations when considering basal layer dose from betas with a half value layer less than 1 mm tissue.

Thus it appears that 15 rad beta whole body from La-140 is within Part 20 limits and (b) (6)'s proposal departs from 10-CFR-20 only in that he indicated "3 rad gamma and 15 rad beta". Had he stated "or" instead of "and", the proposal would be entirely acceptable. In view of the likelihood that "or" is intended, I now believe we can issue the license without exception to 10-CFR-20.

(b) (6)

(b) (6)



TELEPHONE CALL AUGUST 1, 1958 to:

Re: Control No. 11540

(b) (6)

Bureau of Ships  
Department of the Navy

(b) (6) had earlier expressed considerable interest in expediting licensing action on USNRDL's proposed decontamination studies with 500 curies of La-140. Thus he was called and given the status of the application.

At the time of the call, we were prepared to issue the license provided we received assurance that the study was to be performed within Part 20 exposure limits. (b) (6) stated that he was certain that Part 20 limits were to be followed. When we indicated that we needed a statement to that effect from USNRDL, (b) (6) suggested we contact them for verification. He mentioned that the paperwork which would be involved if he were to send a dispatch to USNRDL would preclude an early reply, thus I said we would call.

(b) (6)

(b) (6)



June 17, 1958

- License No. 4-487-3

(b) (6)

Telephone Call to: (b) (6) re USNRDL proposal for decontamination study with 200 curies of Lanthanum 140.

(b) (6) stated that they had received a copy of the USNRDL letter of May 23, 1958, and as he was uncertain that we had a copy, he had forwarded his copy to us with his June 13 letter of transmittal, No. 372-116. (b) (6) said that as usual his group went along with the proposal. He requested that if a license or an amendment is issued for the study that we send it back through his office. I indicated that this would be done.

(b) (6)

(b) (6)

6/17/58

6/4/58 called (b) (6) office and left message for him that we had licensed USNRDL for Ls-140 work and that we had sent them (USNRDL) a telegram to that effect this morning. Further informed Buships that the license will be sent thru Buships in a couple days.



Form AEC-313 (2-57)	ATOMIC ENERGY COMMISSION <b>APPLICATION FOR BYPRODUCT MATERIAL LICENSE</b>	Form approved. Budget Bureau No. 38-R0273.		
<p><b>INSTRUCTIONS.</b>—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U. S. Atomic Energy Commission, P. O. Box E, Oak Ridge, Tenn. Attention: Isotopes Extension, Division of Civilian Application. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the licensee is subject to Title 10, Code of Federal Regulations, Part 20.</p>				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <p>1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.)</p> <p>U.S. Naval Radiological Defense Laboratory San Francisco 24, California</p> </td> <td style="width: 50%; border: none; vertical-align: top;"> <p>(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a).)</p> <p>Camp Stoneman Pittsburg, California</p> </td> </tr> </table>			<p>1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.)</p> <p>U.S. Naval Radiological Defense Laboratory San Francisco 24, California</p>	<p>(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a).)</p> <p>Camp Stoneman Pittsburg, California</p>
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<table style="width: 100%; border: none;"> <tr> <td style="width: 33%; border: none; vertical-align: top;"> <p>6. (a) BYPRODUCT MATERIAL (Elements and mass number of each.)</p> <p>La<sup>140</sup></p> </td> <td style="width: 66%; border: none; vertical-align: top;"> <p>(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)</p> <p>La<sup>140</sup> will be adsorbed onto soil as a tracer of the soil. 2000 mc maximum will be used in one run.</p> </td> </tr> </table>			<p>6. (a) BYPRODUCT MATERIAL (Elements and mass number of each.)</p> <p>La<sup>140</sup></p>	<p>(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)</p> <p>La<sup>140</sup> will be adsorbed onto soil as a tracer of the soil. 2000 mc maximum will be used in one run.</p>
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<p style="font-size: 2em; margin: 0;">DUPLICATED</p> <p style="margin: 0;">FOR DIV. OF INSP.</p>				
<p>7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)</p> <p>La<sup>140</sup> will be used as a tracer of soil in determining the contaminability characteristics of personnel operating as combat troops. (See supplement 1).</p>				



## TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	USNRDL	6 yrs	Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	USNRDL	6 yrs	Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity	University of California Extension	5 units	Yes No	Yes No
d. Biological effects of radiation	USNRDL	Lecture series	Yes No	Yes No

## 9. EXPERIENCE WITH RADIATION. (Actual use of radioisotopes or equivalent experience.) Also see Supplement 1, Para. 5, Item 9

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
La-140	6000 mc/run	Camp Stoneman I	2 months	As tracer in soil
Y-90	500 mc/run	USNRDL	1 month	As tracer in soil
Sr-90	2000 mc/run	USNRDL	2 months	In a separation process

## 10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm <sup>2</sup> )	USE (Monitoring, surveying, measuring)
Cutie Pie	10	$\beta$ - $\gamma$	5 mrep/hr- 10 rep/hr	75 mg/cm <sup>2</sup>	Monitoring
AN/PDR-27	12	"	.02 mrep/hr	30 mg/cm <sup>2</sup>	Monitoring
Berkeley 2750-1	9	$\beta$ - $\gamma$	.02 mrep/hr	100 mg/cm <sup>2</sup>	Monitoring
NaI Scintillation Detector	2	$\gamma$	10 <sup>-4</sup> mc	250 mg/cm <sup>2</sup>	Measuring
NaI Scintillation Deepwell Detector	1	$\gamma$	10 <sup>-4</sup> mc	100 mg/cm <sup>2</sup>	Measuring

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE. See Supplement 1, Para. 5, Item 11. Co-60 and Ra sources calibrated by BuStandards. Weekly calibration on a range for rate meters; daily, by  $\gamma$  counting of prepared standard for Scintillation Detectors.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.) See Supplement 1, Para. 5, Item 12. DuPont film packet 555 and 510 calibrated against U and Ra standards and processed by standard DuPont developing procedures and adequate controls.

## INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes ☒ No ☐ To be covered by separate request pertaining to procurement of La-140.
14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source. See supplement 1, Para. 4 and Para. 5, Item 14.
15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. See supplement 1, Para. 5, Item 15.

## CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Date

5/26/58

By

(b) (6)

Chairman, Radioisotope Committee

Title of certifying official

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.



Form AEC-313 a (3-56) PAGE 1	UNITED STATES ATOMIC ENERGY COMMISSION <b>APPLICATION FOR BYPRODUCT MATERIAL LICENSE</b> SUPPLEMENT A—HUMAN USE	Form approved. Budget Bureau No. 38-R080.
If byproduct material is for "human use" (internal administration of byproduct material, or the radiation therefrom to human beings), complete this supplement and attach to the application for byproduct material license.		
1. (a) USING PHYSICIAN'S NAME  <div style="text-align: center;">None</div>	(b) NAME AND ADDRESS OF APPLICANT (if different from 1(a))  <div style="text-align: center;">           U.S. Naval Radiological Defense Laboratory            San Francisco 24, California         </div>	
2. THE USING PHYSICIAN INDICATED ABOVE IS LICENSED TO DISPENSE DRUGS IN THE PRACTICE OF MEDICINE BY A STATE OR TERRITORY OF THE UNITED STATES, THE DISTRICT OF COLUMBIA, OR THE COMMONWEALTH OF PUERTO RICO.  <div style="text-align: right;">CIRCLE ANSWER</div>		YES  NO
3. A STATEMENT OF USING PHYSICIAN'S CLINICAL RADIOISOTOPE EXPERIENCE (PAGE 3 OF THIS SUPPLEMENT) IS SUBMITTED IN SUPPORT OF THIS APPLICATION. IF ANSWER IS NO, USE PAGE 2 OF THIS SUPPLEMENT TO EXPLAIN OR REFER TO OTHER APPLICATION OR RELATED DOCUMENTS ON WHICH THIS INFORMATION APPEARS.  <div style="text-align: right;">CIRCLE ANSWER</div>		YES  NO
<b>PROPOSED DIAGNOSIS OR TREATMENT</b>		
4. (a) DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED INCLUDING SPECIFIC CONDITIONS OR DISEASES TO BE DIAGNOSED OR TREATED (Use page 2 if necessary):  <div style="text-align: center;">           As a tracer of soil in determining the contaminability characteristics of personnel operating as combat troops.         </div> (b) CHEMICAL FORM ADMINISTERED:  <div style="text-align: center;">           La-140 adsorbed onto soil.         </div> (c) DESCRIBE PROCEDURES WHICH WILL BE OBSERVED TO MINIMIZE HAZARD FROM HANDLING, STORAGE, AND DISPOSAL OF THE BYPRODUCT MATERIAL: Full radiological safety precautions will be observed, including monitoring to determine radiation levels, time limits will be set at short enough intervals to prevent overexposures, respiratory protection will be used until proven unnecessary by constant air sampling; no storage or disposal problems due to short half-life.* (d) DESCRIPTION AND SKETCHES OF SPECIAL DEVICES TO BE USED FOR ADMINISTERING BYPRODUCT MATERIAL TO HUMAN BEINGS ARE (1) ATTACHED (LITERATURE REFERENCES WILL SUFFICE) <span style="float: right;">CIRCLE ANSWER</span> YES <input checked="" type="radio"/> NO (2) ON FILE WITH THE ISOTOPES EXTENSION <span style="float: right;">CIRCLE ANSWER</span> YES <input checked="" type="radio"/> * See also supplement 1, para. 4. REFER TO APPLICATION NO _____		
5. PROPOSED DOSAGE SCHEDULE (a) In millicuries for internally administered byproduct material other than discrete fixed sources; and in roentgens or rads, as appropriate, for internal or external irradiation from discrete fixed sources (gold seeds, cobalt needles, etc.) state separately for each condition or disease (use page 2 if necessary): Dosages will be minimum necessary to record on sensitive films placed on external body surfaces (skin). Activity range will be from minimum of 0.001 uc/cm <sup>2</sup> to maximum of 0.1 $\mu$ c/cm <sup>2</sup> , corresponding to total maximum deep tissue dose of 200 mrad. Details are in supplement 1.  <div style="text-align: center; font-size: 2em; opacity: 0.5;">           DUPLICATED            FOR DIV. OF INSP.         </div> (b) INVESTIGATIVE PROPOSAL FOR EXPERIMENTAL, NEW OR UNUSUAL HUMAN USES IS ATTACHED. (Attachment should include outline of conditions to be evaluated, including data from animal studies and/or abstract of literature reference if any, number and type of patients (i. e. age group, moribund, etc.)) <span style="float: right;">CIRCLE ANSWER</span> YES <input checked="" type="radio"/> NO		
6. IF BYPRODUCT MATERIAL WILL NOT BE OBTAINED IN PRECALIBRATED FORM FOR ORAL ADMINISTRATION OR IN PRECALIBRATED AND STERILIZED FORM FOR PARENTERAL ADMINISTRATION, DESCRIBE IDENTIFICATION, PROCESSING, AND STANDARDIZATION PROCEDURES:  <div style="text-align: center;">           No oral administration.         </div>		
7. THE PROPOSED USE OF BYPRODUCT MATERIAL HAS BEEN, OR WILL BE, APPROVED BY THE MEDICAL ISOTOPE COMMITTEE. <span style="float: right;">CIRCLE ANSWER</span>		YES <input checked="" type="radio"/> NO
<b>HOSPITAL FACILITIES FOR INDIVIDUAL PRACTICE USE ONLY</b>		
8. (a) THE APPLICANT HAS COMPLETED ARRANGEMENTS FOR A HOSPITAL TO ADMIT RADIOACTIVE PATIENTS WHENEVER ADVISABLE. <span style="float: right;">CIRCLE ANSWER</span>		YES  NO
(b) A COPY OF INSTRUCTIONS TO BE FURNISHED TO THE HOSPITAL AS TO RADIOLOGICAL SAFETY PRECAUTIONS TO BE TAKEN AND AVAILABLE RADIATION INSTRUMENTATION IS ATTACHED. <span style="float: right;">CIRCLE ANSWER</span>		YES  NO



Form AEC-313 a  
(3-56)  
PAGE 2

UNITED STATES ATOMIC ENERGY COMMISSION

**APPLICATION FOR BYPRODUCT MATERIAL LICENSE**

**SUPPLEMENT A—HUMAN USE**

Form approved.  
Budget Bureau No. 38-R080.

This page may be used for providing additional information. Please cross reference to specific items.

See Supplement 1



4-487-5 (255)  
933-114  
(b) (6)

Supplement (1) to AEC-313 (2-57) USNRDL

Subj: Proposal for use of Lanthanum 140 - traced soil on human volunteers in connection with environmental studies

1. One of the objectives in the Department of the Army Research Program "Development of Reclamation Procedures for Land Targets" is to determine the contaminability characteristics of personnel (and clothing) exposed to contact with beta-radiation emitters when operating as combat troops in a fallout area.
2. Preliminary Studies: Approximately 100 mg of soil containing 1 uc/gm of La140 will be placed within a 10 cm<sup>2</sup> circle on the forearm of 2 civilian and 2 military volunteers and remain there for a period of six hours. The experiment will enable the determination of the relationships between the actual mass loading of the synthetic fallout on the skin, the specific activity of the soil, the radiac reading of the soil, and the dosimeter film exposure.
3. Field Test: The field test will consist of up to 15 test runs with 6 to 12 men per run involving a total of approximately 50 individuals. A test run will include four phases: Preparatory phase - This includes distributing synthetic fallout over the test area and then a radiation survey of the area. Maneuvering phase - Personnel will perform typical army tactical maneuvers on the test area outfitted appropriately for the maneuver. Monitoring phase - Upon completion of the prescribed maneuvers, each soldier will be given a detailed radiation check with a portable instrument. Dosimetry phase - Dosimeter films will be exposed on the soldiers and their clothing separately to determine the distribution and degree of traced soil "contamination".

The initial runs, Runs A, B, and C, will be used to establish test conditions for the other runs and to ascertain that the maximum permissible radiation exposure to personnel will not be exceeded. The conditions of Run A have been set to give radiation dosages at the lower limit of film detectability. Runs B and C will be used to bring the radiation level up by steps to the point of good instrumentation. Run C will be required only if dosage estimates have been so conservative that Run B does not give quantitative results. (The radiation dosage required for quantitative results is expected to be 100 to 1000 mrad beta). Table 1 gives anticipated dosages to soldiers participating in Runs A, B, and C if required. Appendix A gives the test conditions and computations for these runs.



4-487-5  
(LS) 933-114  
(b) (6)

Table 1 Anticipated Dosages to Personnel During Initial Test Runs.  
Body of Table Gives Dosage in mrad.

Run No.		Maneuvering	Monitoring	Dosimetry	Total
A	deep dose ( $\gamma$ )	.60	.26	1.3	2.2
	skin dose ( $\beta+\gamma$ )	9.3	3.1	15.3	28
$\beta$	deep dose ( $\gamma$ )	6.0	2.6	13	22
	skin dose ( $\beta+\gamma$ )	93	31	153	280
C (if req'd)	deep dose ( $\gamma$ )	43	19	93	155
	skin dose ( $\beta+\gamma$ )	663	219	1093	1975

The maximum permissible whole body exposure for a single exposure period is 3000 mr gamma and 15000 mrad beta.

Appendix A gives the method of computation.

4. The contamination of and dosage to personnel participating in the test runs will be controlled by the following means:

a. Synthetic fallout: The  $\text{La}^{140}$  is produced from high purity  $\text{La}_2\text{O}_3$  by neutron irradiation and is checked for radiochemical purity prior to field tests. Lot 731, which will be used for these tests showed a 40 hr half-life after 14 half-lives and the gamma spectra revealed no impurities. The solubility of the radionuclides was found to be less than 0.1 percent for 1 gram of synthetic fallout in 100 ml water. Each irradiated lot is assayed when received to insure a controlled specific activity which ranges from 1 microcurie/gram to 10 microcurie/gram.

b. The test area will be monitored to determine gamma radiation intensity before the maneuvering period, and the total time interval for maneuvering will be set short enough to assure a gamma dosage considerably below the MPE (see Table 1).

c. Pocket ionization chambers and dosimeter film badges will be worn throughout the test runs to give a continuous indication and a permanent record of dosage.



4-127-5  
(933-114)  
(b) (6)

d. In order to prevent inhalation of the synthetic fallout, gas masks (Mark 9) shall be worn during the preliminary runs, A, B, and C. After each of these runs, the filters of the masks will be given to the Radiological Safety representative for evaluation. The use of gas masks for the remainder of the runs will be contingent upon the Rad-Safe representative's recommendation.

e. A Radiological Safety representative will be present during the test runs to assess and advise the project officer on the radiological situation.

f. The monitoring period, with its thorough radiation survey of the soldier, will be used to determine if prompt showering is advisable and to determine the time required for film exposure during the dosimetry period.

g. Soldiers will not be released from the test area before showering and Radiological Safety monitoring.

h. Excretory specimens from the soldiers will be collected and radiation-counted to determine the magnitude of internal "contamination".

i. All men participating in these tests will be thoroughly informed as to radiological health aspects of their participation in this test. Written statements of voluntary participation will be obtained from each man.

5. The following paragraphs give information to Supplement that given on AEC-313 (2-57). The Item numbers refer to corresponding item numbers of AEC-313 (2-57).

Item 8. Training and experience of individual users is as follows:

(b) (6) has been a member of the Scientific Staff of USNRDL for 8 years. During this time he has received much experience and informal training in the principles and practices of radiation protection and monitoring techniques and instruments through his participation in the weapons tests. In addition, has taken 3 units of formal training from University of California Extension in atomic physics, including nuclear processes and measurements. At USNRDL, (b) (6) was in attendance at a seminar and lecture series conducted by Dr. (b) (6) on the biological effects of radiation.

(b) (6) has been a member of the Scientific Staff of USNRDL for 5 years. During this time he has received much experience and informal training in the principles and practices of radiation protection and monitoring techniques and instruments through his participation in the weapons tests. In addition, has taken 5 units of formal training from University of California Extension in nuclear physics, including nuclear processes and measurements. At USNRDL, Mr. (b) (6) was in attendance at a seminar and lecture series conducted by Dr. (b) (6) on the biological effects of radiation.



Item 9. Mr. (b) (6)'s experience with the use of radioisotopes, in addition to operating crews in areas contaminated by the fallout from weapon tests, includes:

- a.  $\text{La}^{140}$ , 6000 mc/run at Camp Stoneman for 2 months, where the  $\text{La}^{140}$  was used as a tracer for soils.
- b.  $\text{Y}^{90}$ , 500 mc/run at San Bruno for 1 month, where the  $\text{Y}^{90}$  was used as a tracer for soil.

Mr. (b) (6)'s experience with the use of radioisotopes, in addition to operating crews in areas contaminated by the fallout from weapons tests, includes:

- a.  $\text{Y}^{90}$ ,  $\text{Sr}^{90}$ , 2000-mc/run at USNRDL in a process of separating  $\text{Y}^{90}$  from  $\text{Sr}^{90}$ .
- b. Mfp, 100 mc/run at USNRDL in decontamination experiments

Item 11.  $\text{Co}^{60}$  and Ra sources calibrated by Bureau Standards. Weekly calibration on a range for monitoring equipment; daily, for scintillators.

Item 12. DuPont Duopak 555 and 510 films using U and Ra calibration, processing and controls as per DuPont instruction.

0-200 mr and 0-5r self reading dosimeters will be issued to all persons exposed to radiations from  $\text{La}^{140}$ .

Facilities will be available for radioanalysis of urine specimens.

Item 14. (a) (b) (6), Chairman, Radioisotope Committee at USNRDL since 1951; Head, Health Physics Division at USNRDL since March, 1953 to date; 2 years as Head, Radiological Safety Branch, USNRDL; 4 months as Radiological Physicist, Assistant Head, Health Physics Branch, USNRDL; 8 months as Vacuum Engineer, Carbide and Carbon Chemical Corp., Oak Ridge, Tenn.; 5 months as Physicist at Tennessee Eastman Corp., Oak Ridge; 2-1/4 years as Physicist, Kellogg Corp., New York; 2 months as Senior Engineer with Jackson and Moreland Co., Boston, Mass.

(b) The following named trained physicians are members of the Laboratory Staff and will be available at all times for consultation:

Capt. (b) (6), MC, USN, a physician trained in internal medicine; has wide experience in physiological research.

(b) (6), M.D., Emeritus Professor of Radiology, Stanford University Medical School.



933-114  
RHB:mcj

Item 15. The area contaminated by the  $\text{La}^{140}$  traced soil will be controlled for 3 months. As  $\text{La}^{140}$  has a 40 hrs half life, this will give a decay to  $10^{-15}$  the original isotope level, which is ample decay for permitting unrestricted access.



## APPENDIX A DOSAGE COMPUTATION, ETC.

TABLE A-1 TEST CONDITIONS

	Run A	Run B	Run C
Specific activity of traced soil	0.1 $\mu\text{c/gm}$	1 $\mu\text{c/gm}$	2 to 10 $\mu\text{c/gm}$
Mass loading of traced soil on terrain	20 $\text{gm/ft}^2$	20 $\text{gm/ft}^2$	20 $\text{gm/ft}^2$
Maneuvering time	1/2 hr	1/2 hr	1/2 hr
Monitoring time	1/2 hr	1/2 hr	1/2 hr
Dosimetry time	5 hr	5 hr	5 hr

TABLE A-2 ASSUMPTIONS USED IN COMPUTING DOSAGES

Assumptions	Effect on Dosage Estimate	Computation Affected
Gamma energy is 2 Mev	slightly conservative	all $\gamma$
Test area is an "infinite field"	conservative	$\gamma$ bath
Beta "bath" dosage can be computed from the contact $\beta$ formula	high conservative	$\beta$ bath
Mass loading of soil on skin is 5 $\text{mg/cm}^2$	very conservative	$\beta$ - $\gamma$ skin
Mass loading of soil on clothes is 5 $\text{mg/cm}^2$	very conservative	$\beta$ - $\gamma$ clothes
Dosages to a particular tissue area delivered simultaneously from different sources are cumulative	no effect on estimate	all totals
Dosages from clothing can be computed as if the soil were in contact with skin	conservative	$\beta$ - $\gamma$ clothes

## METHOD OF COMPUTATION

The reference used for computations is J. D. Teresi and A. Broido, "Estimation of the Gamma Dose Associated with Radioactive Fallout Material", USNRDL-TM-18 (1954).

For the computation of dosages to an individual during a test run, the following formulae and nomenclature will be used:

$$\begin{array}{lll}
 I_{\gamma} = K_{\gamma} A E & \text{for gamma} & (1) \\
 I_{\beta} = K_{\beta} A & \text{for beta} & (2) \\
 D = I t
 \end{array}$$



A	= activity level ( $\mu\text{c}/\text{cm}^2$ )	$K_{\beta}$ skin	= 5.5
$D_{\gamma}$	= dosage for gamma (r)	$I_{\gamma}$	= dose rate $\gamma$ (r/hr)
$D_{\beta}$	= dosage for beta (rad)	$I_{\beta}$	= dose rate $\beta$ (rad/hr)
E	= $\gamma$ photon energy (Mev)	t	= time (hr)
$K_{\gamma}$ bath	= 0.16		
$K_{\gamma}$ clothes	= 0.26		
$K_{\gamma}$ skin	= 0.26		
$K_{\beta}$ bath	= 5.5		
$K_{\beta}$ clothes	= 5.5		

Equations (1) and (3) combined give

$$D_{\gamma} = K_{\gamma} \text{ AET}$$

#### Run A During Maneuvering

Gamma dosage from terrain

$$D_{\gamma} \text{ bath} = 0.16 \times 20 \text{ g/ft}^2 \times 1 \text{ ft}^2/930 \text{ cm}^2 \times 0.1 \mu\text{c/gm} \times 2 \text{ Mev} \times 1/2 \text{ hr}$$

$$D_{\gamma} \text{ bath} = 0.344 \times 10^{-3} \text{ r}$$

Similarly:

$$D_{\gamma} \text{ clothes} = 0.26 \times .005 \times 0.1 \times 2 \times 1/2 = 0.13 \times 10^{-3} \text{ r}$$

$$D_{\gamma} \text{ skin} = 0.26 \times .005 \times 0.1 \times 2 \times 1/2 = 0.13 \times 10^{-3} \text{ r}$$

$$D_{\gamma} \text{ TOTAL} = 0.60 \times 10^{-3} \text{ r}$$

$$D_{\beta} \text{ bath} = \frac{5.5 \times 20 \times 0.1 \times 1/2}{930} = 5.9 \times 10^{-3} \text{ rad}$$

$$D_{\beta} \text{ clothing} = 5.5 \times .005 \times 0.1 \times 1/2 = 1.4 \times 10^{-3} \text{ rad}$$

$$D_{\beta} \text{ skin} = 5.5 \times .005 \times 0.1 \times 1/2 = 1.4 \times 10^{-3} \text{ rad}$$

$$D_{\beta} \text{ TOTAL} = 8.7 \times 10^{-3} \text{ rad}$$

#### During Monitoring

$$D_{\gamma} \text{ clothing} = 0.26 \times .005 \times 0.1 \times 2 \times 1/2 = 0.13 \times 10^{-3} \text{ r}$$

$$D_{\gamma} \text{ skin} = 0.26 \times .005 \times 0.1 \times 2 \times 1/2 = 0.13 \times 10^{-3} \text{ r}$$

$$D_{\gamma} \text{ TOTAL} = 0.26 \times 10^{-3} \text{ r}$$



$$\begin{array}{llll} D_{\beta} \text{ clothing} & = 5.5 \times .005 \times 0.1 \times 1/2 & = 1.4 \times 10^{-3} \text{ rad} \\ D_{\beta} \text{ skin} & = 5.5 \times .005 \times 0.1 \times 1/2 & = 1.4 \times 10^{-3} \text{ rad} \\ D_{\beta} \text{ TOTAL} & = & \underline{2.8 \times 10^{-3} \text{ rad}} \end{array}$$

During Dosimetry

$$\begin{array}{llll} D_{\gamma} \text{ skin} & = 0.26 \times .005 \times 0.1 \times 5 & = 1.3 \times 10^{-3} \text{ r} \\ D_{\beta} \text{ skin} & = 5.5 \times .005 \times 0.1 \times 5 & = 14 \times 10^{-3} \text{ rad} \end{array}$$

The dosages from Run B and C will be x10 and x70 the dosages from Run A, as the only change in conditions is the specific activity of the soil for Run B, and it is x10 and x70 the specific activity used for Run A.



4-787-5  
(L58)

AUGUST 4, 1958

(b) (6), ASSISTANT CHIEF  
ISOTOPES BRANCH  
DIVISION OF LICENSING AND REGULATION  
U.S. ATOMIC ENERGY COMMISSION  
WASHINGTON, D.C.  
U.S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
ATTENTION: (b) (6)  
SAN FRANCISCO 24, CALIFORNIA

ROUTINE

LICENSE NO 4-487-5 ISSUED AUGUST 4, 1958 TO USNRDL FOR DECONTAMINATION STUDIES  
AT CAMP STONEMAN WITH 500 CURIES OF LA-140 PD FURTHER REVIEW OF YOUR APPLICATION  
RESOLVED OUR BETA DOSE QUESTIONS END REF L&R:IB:DAS

(b) (6)

11:05 am

5126 Room 1120

OFFICE ▶

Isotopes

Isotopes

SURNAME ▶

(b) (6)

DATE ▶

8-4-58

8-4-58



## Office Memorandum • UNITED STATES GOVERNMENT

TO : (b) (6), Assistant Chief  
Isotopes Branch, Division of Licensing and Regulation

FROM : (b) (6), Chief, Radiation Safety Branch  
Division of Licensing and Regulation

SUBJECT: USNRDL LA 140 - WORK AT CAMP STONEMAN

SYMBOL: DLR:CMF

DATE: AUG 1 1958

Conclusions

The application presented in letters included with your memorandum of July 24, 1958, appears to be satisfactory from the radiological safety standpoint. In view of the strict radiological controls to be used in the test, it is suggested that any approval include an interpretation in an accompanying letter, that this is considered to be a laboratory exercise and does not constitute field application. A further note should be added to clarify that the La capsules are not considered to be sealed sources and not subject to leak test requirement or Condition 14 of the license pertaining to not opening of sealed sources.

Items Which Should Be Resolved

(1) Some type of respiratory protection should be used at all times that the concentrations exceed the limits in Part 20 for airborne concentrations during the contaminating, maneuvering and cleanup of the contaminated areas.

(2) The licensee should be informed that an average of 0.3 rem/wk (not to exceed) or the 3 rem/13 weeks for the eyes and gonads will be the limiting factor for both beta and gamma exposure. Due to these lower limits, the permissible exposure to the whole body (eyes, gonads, and body) will be 3 rad beta and gamma and not 3 rad gamma and 15 rad beta as stated on Page 2, Table I of the application dated May 26, 1958. The greater dose rate, if used, will have to be approved by the Division of Biology and Medicine.

Material

500 curies La 140, possession limit. No more than 2 curies to be used in any one experiment.

Purposes of Experiments

A through D on Page 2 of (b) (6) letter of June 13, 1958.

Procedures

La 140 will be prepared in solution for mixing with the bulk carrier material (soil) from behind a shielded concrete wall and remote control (master-slave) manipulators.



(b) (6)

Page 2

AUG 1 1950

The dry fallout simulant will be prepared by combining the La 140 solution and the bulk carrier material in a modified transit mix truck (cement mixer). Slurry fallout simulant will be prepared and dispersed in a modified Chemical Corporation decontamination truck,

The dry simulant will be dispersed by means of a spreader mounted on the rear of a dump truck.

Roofing areas will be contaminated by means of hand drawn dispensers.

#### Test Procedures

Put in Items 1 through 4 from Page 2.

#### Radiological Safety Procedures

Radiation monitors will be present during the preparation, dispersal and decontamination of the synthetic fallout area. The health physics group will advise the project officer on radiological safety procedures and to minimize radiation exposure to project personnel.

Continuous air sampling will be conducted at the boundary of the control area during test operations. Water run off will be collected in storage pits and will be sampled prior to release to the environs.

The military personnel assigned to the project will be instructed in radiological safety.

The test areas will be monitored to determine gamma activity before maneuvering, and the total time for maneuvering will be set short enough to assure a gamma dosage considerably below the MPE.

The radiological safety standards are based on Nav. Med. P-1325 (Rev. 1951), 10 CFR 20, 3 r/13 weeks not to exceed 5 r/operation provided the lifetime accumulated dose does not exceed (N-18 x 5 rem). The MPC for La 140 for air and water are taken from 10 CFR 20. The MPC for skin, clothing and equipment contamination are taken from USNRDL Health Physics Division's MPC's for routine and special operations.

#### Radiation Detection and Personnel Equipment

Film badges, self-reading dosimeters, Geiger Counters, count rate meters, aerosol samples, scalars, gas masks, coveralls, shoes, gloves, booties, caps.

#### Field Test

The test will consist of up to 15 test runs with 6 to 12 men/run. The test will include four phases.

1. Preparatory phase - contaminating the area.
2. Maneuvering phase - maneuver of troops in the area for periods up to  $\frac{1}{2}$  hour.



(b) (6)

Page 3

3. Monitoring phase - detailed radiation check.
4. Dosimetry phase - films will be applied to soldiers and their clothing separately to determine the distribution of contamination. The three initial runs A, B, and C will be used to establish test conditions and to ascertain that the MPE to personnel will not be exceeded.

The maximum anticipated exposure from the "C" run for the maneuvering, monitoring and dosimetry phases for beta and gamma is 1975 mrad. The radiation dosages required for quantitative results is expected to be from 100 to 1000 millirads beta. Gas masks will be used. The filters on the ~~mask~~ masks will be given to the R.S.O. for evaluation. The R. S. O. will be present during the test runs to assess and advise the project officer on the radiological situation.

The soldiers will be surveyed after the maneuvering to determine if a prompt shower is advisable and to determine the time required for film exposure during the dosimetry period. The soldiers will not be released from the test areas before showering and radiological safety monitoring. Excretory specimens will be taken to determine magnitude of ingestion or inhalation.

#### Decontamination

An Army barracks will be used as the decontamination and health physics center. It is located near the test area. All personnel entering or leaving the area will be processed. Standard clothing and equipment will be issued for use as protective clothing.

#### Experience of Users

Messrs. (b) (6) and (b) (6) have had experience in weapons tests and, therefore, should be technically capable of carrying out a safe program. The health physicist, Mr. (b) (6) appears to have had sufficient experience to assist in the tests.

Two physicians will be available at all times for consultation.

DUPLICATED  
FOR DM. OF INS.



## Office Memorandum • UNITED STATES GOVERNMENT

4-487-5 (258)

TO : (b) (6)  
Radiation Safety Branch, DLR

FROM : (b) (6)  
Assistant Chief, Isotopes Branch, DLR

SUBJECT: USNRDL La-140 - WORK AT CAMP STONEMAN

SYMBOL: DLR:DAS:rm

DATE: July 24, 1958

Transmitted herewith is an application from the U. S. Naval Radiological Defense Laboratory requesting a license for 500 curies of Lanthanum 140. The material will be used in decontamination studies by the Armed forces. Since the proposal as presented departs in several respects from the recommendations of 10-CFR-20, we would appreciate your comments on the study. Captain (b) (6) of the U. S. Navy has requested an early review of the application.

## Encls.:

1. Ltr of June 25, 1958 fm Capt. (b) (6), Navy;
2. 313 appl. fm US Naval Rad. Def. Lab., SF. Cal.;
3. Ltr of May 23, 1958 fm Comm. (b) (6), Navy;
4. Ltr of June 13, 1958 fm (b) (6), Navy;
5. Ltr of June 26, 1958 fm Capt. (b) (6), Navy;
6. Ltr of July 1, 1958 fm (b) (6), Navy;
7. Ltr of July 22, 1958 fm Capt. (b) (6), Navy.



A circular stamp from the U.S. Army, Division of Licensing and Regulations. The text "U.S. A. R. C." is in the center, with "Division of Licensing and Regulations" written around it. The date "JUL 3 1964" is stamped across the middle. At the bottom, the word "RECEIVED" is printed. The stamp is surrounded by a circular border with numbers 1 through 12.

A circular stamp from the U.S. Atomic Energy Commission (A.E.C.). The outer ring contains the text "U.S. ATOMIC ENERGY COMMISSION" in a circular arrangement. Inside the ring, the words "RECEIVED" are printed in large, bold, capital letters. Below "RECEIVED", the text "Division of Licensing and Regulations" is written in a smaller font. At the bottom of the stamp, there is a small, illegible mark or signature.



9-487-5  
U.S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO 24, CALIFORNIA (258)

MAY 5 1958

1492

730-112  
ALS:ams  
23 May 1958

U.S. Atomic Energy Commission  
Division of Civilian Application  
Licensing Branch  
Washington 25, D.C.

Attention: Mr. (b) (6)

Gentlemen:

Reference is made to our AEC Byproduct Material License No. 4-487-3, in which the maximum amount of Lanthanum 140 the Laboratory is authorized to possess at one time is 25 curies.

The Laboratory is presently planning an experimental project entitled, "Development of Reclamation Procedures for Land Targets," to be held at a deactivated Army base, Camp Stoneman, Pittsburg, California. Test requirements are such that it will be necessary to have as much as 200 curies of Lanthanum 140 in standby storage or in use at one time. Therefore, it is requested that the possession limit for Lanthanum 140 under License No. 4-487-3 be increased from 25 curies to 200 curies.

For your information an abstract of the experimental procedures to be used during the project is enclosed. Lanthanum 140 will be used as a radioactive tracer in these studies. An abstract of the radiological safety controls that will be applied to the use of this material is also enclosed.

Further reference is made to Condition No. 15 of License No. 4-487-3, "Byproduct material shall not be used in or on human beings, products distributed to the public, or field applications." Our isotope supplier has questioned the proposed use of Lanthanum 140 as possibly falling under "field applications." We would appreciate, after review of the enclosures, your concurrence that this is a controlled laboratory use and not a field application as the term is defined in the license.



730-112  
ALS:ams  
21 May 1958

In order to expedite authorization approval, in case it might be necessary, we are applying, by separate correspondence, for the necessary authorization to accomplish objective (d), Condition 15, of License 4-487-3, which involves the human use aspect.

We shall be glad to supply any further information you may require.

Very truly yours,

(b) (6)

Commander, USN  
Acting Commanding Officer  
and Director

Enclosures:  
Development of Reclamation Procedures  
for Land Targets  
Rad-Safety Measures for Land Target  
Reclamation Study

Copy to:  
BuShips (348) w/encl  
BuMed (74) "



4-487-5  
(258)

ABSTRACT

DEVELOPMENT OF RECLAMATION PROCEDURES FOR LAND TARGETS

INTRODUCTION

A series of experiments is planned for the period 15 August to 15 October 1958 at Camp Stoneman, Pittsburg, California, to evaluate land target reclamation techniques.

The specific objectives are:

- a. To determine the relationship between recovery effectiveness and those factors affecting operational efficiency in order to define optimum performance characteristics of the basic decontamination procedures.
- b. To develop new reclamation techniques for land targets with emphasis on waterless decontamination procedures such as motorized sweeping, vacuum cleaning, etc.
- c. To determine the influence of various soil characteristics and repeated method applications on the effectiveness of the basic land reclamation techniques.
- d. To determine the contaminability characteristics of personnel (and clothing) exposed to contact beta radiation emitters when operating as combat troops.

Contaminant Materials

A synthetic fallout material consisting of a radioisotope (Lanthanum 140) and a bulk carrier material will be dispersed over the test area in such concentrations (grams per square foot) to simulate the mass of material that would be deposited under actual fallout conditions.

The facilities at the MTR, Arco, Idaho, will be used to produce the Lanthanum 140. Two grams of  $\text{La}_2\text{O}_3$  will be encapsulated in quartz capsules and irradiated in a neutron flux of  $10^{14}$  n/cm<sup>2</sup>/sec for a time sufficient to produce approximately 6 curies of Lanthanum 140 on the day it is to be used at the test site.

The Lanthanum 140 will be prepared in solution for mixing with the bulk carrier material from behind a concrete block shielding wall by means of a pair of master slave manipulators.

The dry fallout simulant will be prepared by combining the Lanthanum 140 solution and the bulk carrier material in a modified transit mix truck. Slurry fallout simulant will be prepared by combining the Lanthanum 140 solution and the slurry mixture in a modified Chemical Corp. decontamination truck.



Dry simulant will be dispersed over the test areas by a spreader mounted on the rear of a dump truck. The slurry simulant will be applied through spray nozzles mounted on the rear of the decon. truck. The wet and dry simulant will be applied to roofing areas by means of hand drawn dispersers.

#### Test Procedures

1. To accomplish objective (a), the synthetic fallout, both dry and slurry type, will be applied to asphaltic concrete and Portland cement concrete areas, each 40' x 200' in size and to roofing areas 40' x 40' in size. The decontamination tests will be made with street flushers and fire hoses with several variations of use. Before and after radiation measurements will be made to determine decontamination effectiveness.
2. To accomplish objective (b), the synthetic fallout (dry and slurry) will be applied onto 40' x 200' asphaltic concrete areas and waterless or near-waterless decontamination methods will be used. These include the use of street sweepers, vacuum cleaners, air brooms, etc.
3. To accomplish objective (c), the synthetic fallout will be applied to a 50' x 50' section in the center of a 100' x 400' land test area. Decontamination methods used will be surface removal by road scrapers and plowing.
4. To accomplish objective (d), the synthetic fallout will be applied to two 100' x 100' land areas and troops will be maneuvered through the area. The degree of clothing contamination experienced will be evaluated.



4-487-5  
(258)

ABSTRACT

RADIOLOGICAL SAFETY MEASURES FOR LAND TARGET RECLAMATION STUDY

RADIOLOGICAL SAFETY OPERATIONS

Radiological safety monitors will be present during the preparation and dispersal of the synthetic fallout material and during decontamination operations. The rad-safe group will be directed by a health physicist who will serve as a staff advisor to the project officer. The mission of the rad-safe group will be to advise the project officer on rad-safe measures and to minimize radiation exposure to project personnel, and provide necessary rad-safe support (personnel decontamination center, environmental monitoring, etc.).

Environmental Monitoring. Continuous air sampling will be conducted at the boundary of the controlled area during all test operations. Water run-off will be collected in retention pits and will be sampled prior to release to the environs.

RADIOLOGICAL SAFETY TRAINING

A radiological safety training course will be presented to the military personnel assigned to the project. The course will be sufficient to familiarize the personnel with the land target studies and rad-safe procedures, as applicable.

BASIC RADIOLOGICAL SAFETY STANDARDS

The rad-safe standards will be derived from "Radiological Safety Regulations,"<sup>1</sup> of the Navy Bureau of Medicine and Surgery and from the Atomic Energy Commission "Standards for Protection Against Radiation."<sup>2</sup> The maximum permissible exposure (MPE) will be 3.0 r per 13 weeks not to exceed 5 r for the operation provided the lifetime accumulated exposure of personnel does not exceed  $(N-18) \times 5$  rem where N is the individual's age.<sup>3</sup> The maximum permissible concentration (MPC) for Lanthanum 140 air and surface contamination are taken from the Federal Register, 10 CFR Part 20. The MPC's for skin, clothing and equipment contamination are derived from the USNRDL Health Physics Division's MPC's for routine and special operations.<sup>4</sup> Table 1 tabulates the maximum permissible limits to be used in this operation.

<sup>1</sup> NavMed P-1325 (Rev. 1951)

<sup>2</sup> AEC Federal Register, 10 CFR Part 20, January 29, 1958

<sup>3</sup> National Committee Radiation Protection, Statement of 8 Jan 1957

<sup>4</sup> "Principles of Radiation and Contamination Control" Manual, Review Draft, Fall 1957, Chapter 4.



## RADIOLOGICAL SAFETY FACILITIES AND EQUIPMENT

Personnel Dosimetry. Film badges will be used to document the whole body gamma and beta exposure received by personnel participating in the land target studies. Self-reading pocket ionization chambers will also be used for monitoring the daily personnel exposure. Visitors will be issued film badges to record their radiation exposure. Special wrist film badges will be issued to measure hand exposures as necessary.

Portable Monitoring Equipment. Portable radiac equipment will be used for radiation and contamination monitoring, a Cobalt 60 source will be used to check the gamma calibration of the instruments at the test site. Table 2 lists the available radiac equipment.

Personnel Decontamination Center. A two story Army barracks at the test site will be used as a Personnel Decontamination Center and Rad-Safe Center. It will be located near the test area making it convenient for the processing of all personnel entering and leaving the test area. Standard clothing and equipment will be issued for use as protective clothing. Table 3 lists the protective clothing requirements for processing 75 to 100 personnel per day based on a 2 day laundry cycle.

4-487-5  
(258)

TABLE 1  
TABULATION OF MAXIMUM PERMISSIBLE LIMITS

1. Personnel MPL

(a) Radiation exposure per 13 weeks

	<u>Gamma</u>	<u>Beta</u>
Whole body	3.0 r	15 rad
Hands and feet	15 r	30 rad

(b) Aerosol Activity: Occupational -  $4 \times 10^{-6}$   $\mu\text{c/cc}$   
Environmental -  $1 \times 10^{-7}$   $\mu\text{c/cc}$

(c) Food and potable water: Food and water showing any contamination will not be consumed.

(d) Water to environs - 0.1  $\mu\text{c/ml}$

	<u>MPC</u>	<u>Berkeley 2750 Contamination Meter Indication for MPC</u>
(e) Skin contamination	1,000 d/m/cm <sup>2</sup>	500 c/m

2. Clothing MPC

(a) Personal

General clothing; fixed	1,000 d/m/cm <sup>2</sup>	500 c/m
Shoes; fixed	10,000 d/m/cm <sup>2</sup>	5,000 c/m

(b) Rad-safe clothing for uncontrolled use

Coveralls; fixed	1,000 d/m/cm <sup>2</sup>	500 c/m
Gloves, hats, etc.; fixed	5,000 d/m/cm <sup>2</sup>	2,500 c/m
Shoes; fixed	10,000 d/m/cm <sup>2</sup>	5,000 c/m

(c) Rad-safe clothing for controlled use

Coveralls; fixed	50,000 d/m/cm <sup>2</sup>	25,000 c/m
Gloves, hats, etc.; fixed	100,000 d/m/cm <sup>2</sup>	50,000 c/m
Shoes; fixed	250,000 d/m/cm <sup>2</sup>	---



TABLE 1 (continued)

## TABULATION OF MAXIMUM PERMISSIBLE LIMITS

	<u>MPC</u>	<u>Berkeley 2750 Contamination Meter Indication for MPC</u>
3. Equipment MPC		
(a) Final Clearance		
Fixed	10,000 d/m/cm <sup>2</sup>	5,000 c/m
Removable	5,000 d/m/12 in <sup>2</sup> wipe	2,500 c/m/12 in <sup>2</sup> wipe
(b) Operational Clearance		
Fixed	100,000 d/m/cm <sup>2</sup>	50,000 c/m
Removable	50,000 d/m/12 in <sup>2</sup> wipe	25,000 c/m/12 in <sup>2</sup> wipe
4. Radioactive Sample Shipments		
(a) Courier shipments: DOD Aircraft.	Gamma radiation level to be 1 r/hr at the surface of the container with removable contamination 5,000 d/m/12 in <sup>2</sup> wipe (2,500 c/m on Berkeley 2750 contamination meter).	
(b) Common carrier:	All radioactive shipments by common carrier to conform with ICC Regulations.	

TABLE 2

RECOMMENDED STOCK LEVEL FOR RADIAC EQUIPMENT

4-487-5  
(258)

1. Contamination Meters

AN/PDR-27F	12 each
G.M. Side-window (Berkeley 2750-1)	9 each

2. Dose Rate Meters

AN/PDR-18	2 each
AN/PDR-T1B	2 each
Cutie Pie (El-Tronics Model CP3DM)	6 each

3. Personnel Dosimeters

Film badges (DuPont film 555 and 510)	1500 each
Pocket Ionization Chambers, self-reading, 0-200 mr	75 each
Pocket Ionization Chambers, self-reading, 0-5 r	20 each
Pocket Ionization Chamber Charger	4 each

4. Aerosol Samplers

Portable spot aerosol samplers	6 each
Continuous constant flow suction units	4 each

5. Laboratory Radioassay Equipment

Scaler	2 each
Count Rate Meter, 1615-B	2 each
G.M. Detector, end-window	1 each
G.M. Detector, side-window	1 each

6. Miscellaneous counting standards and calibration sources.



TABLE 3

## PROTECTIVE CLOTHING REQUIREMENTS

4-487-5  
(L58)

<u>Item</u>	<u>Quantity Stocked</u>
Coveralls	300
Shoes	80
Socks	300
Caps	200
Hoods	50
Gloves, cotton, short	300
Gloves, cotton, rubber-dipped	50
Gloves, rubber or Neoprene, heavy	50
Gloves, rubber, Surgeons	100
Booties, plastic	300
Boots, rubber; sizes: 11, 12, 13 (16 each)	48
Shields, face	20
Masks, assault	24
Canisters, spare (for assault masks)	24
Bags, laundry	24
Shirts-T	300
Shorts	300
Towels, bath	300
Gear, foul weather (Rain Parka and trousers)	10
Suit, all plastic	4



DEPARTMENT OF THE NAVY  
BUREAU OF SHIPS  
WASHINGTON 25, D. C.

10787-5 (252) 1574  
JUN 17 1958

IN REPLY REFER TO  
J3/2(372)  
Ser 372-116

13 JUN 1958

U. S. Atomic Energy Commission  
Isotopes Branch  
Division of Licensing and Regulation  
Washington 25, D. C.

Gentlemen:

The U. S. Naval Radiological Defense Laboratory is presently planning a controlled laboratory project entitled "Development of Reclamation Procedures for Land Targets", to be conducted at Camp Stoneman, a deactivated Army base in Pittsburg, California. Test requirements are such that it will be necessary to have as much as 200 curies of Lanthanum 140 in standby storage or in use at one time. License 4-487-3, issued by your office to the Laboratory, limits the possession of Lanthanum 140 to 25 curies. We would appreciate it if you would amend this license to increase the possession limit to 200 curies of Lanthanum 140.

An abstract of the experimental procedures to be used during the test is enclosed for your information (Enclosure (1)). Enclosure (2) is an abstract of the radiological safety controls which will be applied to the use of the material.

By separate correspondence, authority has been requested from the Bureau of Medicine and Surgery and the Secretary of the Navy to use troops in the planned project. Upon receipt of this approval, information will be provided to you to satisfy the conditions of Item 15 of the referenced license.

Your immediate attention to this request will be appreciated.

Sincerely yours, -

(b) (6)

Encl:

- (1) Abstract of experimental procedures to be used in test
- (2) Abstract of the radiological safety controls

(b) (6) (b) (6)  
Head, Special Warfare Section  
Research and Development Division  
By direction of Chief of Bureau



4-487-5  
(L58)

ABSTRACT

DEVELOPMENT OF RECLAMATION PROCEDURES FOR LAND TARGETS

INTRODUCTION

A series of experiments is planned for the period 15 August to 15 October 1958 at Camp Stoneman, Pittsburg, California, to evaluate land target reclamation techniques.

The specific objectives are:

a. To determine the relationship between recovery effectiveness and those factors affecting operational efficiency in order to define optimum performance characteristics of the basic decontamination procedures.

b. To develop new reclamation techniques for land targets with emphasis on waterless decontamination procedures such as motorized sweeping, vacuum cleaning, etc.

c. To determine the influence of various soil characteristics and repeated method applications on the effectiveness of the basic land reclamation techniques.

d. To determine the contaminability characteristics of personnel (and clothing) exposed to contact beta radiation emitters when operating as combat troops.

Contaminant Materials

A synthetic fallout material consisting of a radioisotope (Lanthanum 140) and a bulk carrier material will be dispersed over the test area in such concentrations (grams per square foot) to simulate the mass of material that would be deposited under actual fallout conditions.

The facilities at the MTR, Arco, Idaho, will be used to produce the Lanthanum 140. Two grams of  $\text{La}_2\text{O}_3$  will be encapsulated in quartz capsules and irradiated in a neutron flux of  $10^{14}$  n/cm<sup>2</sup>/sec for a time sufficient to produce approximately 6 curies of Lanthanum 140 on the day it is to be used at the test site.

The Lanthanum 140 will be prepared in solution for mixing with the bulk carrier material from behind a concrete block shielding wall by means of a pair of master slave manipulators.

The dry fallout simulant will be prepared by combining the Lanthanum 140 solution and the bulk carrier material in a modified transit mix truck. Slurry fallout simulant will be prepared by combining the Lanthanum 140 solution and the slurry mixture in a modified Chemical Corp. decontamination truck.

Dry simulant will be dispersed over the test areas by a spreader mounted on the rear of a dump truck. The slurry simulant will be applied through spray nozzles mounted on the rear of the decon. truck. The wet and dry simulant will be applied to roofing areas by means of hand drawn dispersers.

#### Test Procedures

1. To accomplish objective (a), the synthetic fallout, both dry and slurry type, will be applied to asphaltic concrete and Portland cement concrete areas, each 40' x 200' in size and to roofing areas 40' x 40' in size. The decontamination tests will be made with street flushers and fire hoses with several variations of use. Before and after radiation measurements will be made to determine decontamination effectiveness.
2. To accomplish objective (b), the synthetic fallout (dry and slurry) will be applied onto 40' x 200' asphaltic concrete areas and waterless or near-waterless decontamination methods will be used. These include the use of street sweepers, vacuum cleaners, air brooms, etc.
3. To accomplish objective (c), the synthetic fallout will be applied to a 50' x 50' section in the center of a 100' x 400' land test area. Decontamination methods used will be surface removal by road scrapers and plowing.
4. To accomplish objective (d), the synthetic fallout will be applied to two 100' x 100' land areas and troops will be maneuvered through the area. The degree of clothing contamination experienced will be evaluated.



4-487-5  
(258)

ABSTRACT

RADIOLOGICAL SAFETY MEASURES FOR LAND TARGET RECLAMATION STUDY

RADIOLOGICAL SAFETY OPERATIONS

Radiological safety monitors will be present during the preparation and dispersal of the synthetic fallout material and during decontamination operations. The rad-safe group will be directed by a health physicist who will serve as a staff advisor to the project officer. The mission of the rad-safe group will be to advise the project officer on rad-safe measures and to minimize radiation exposure to project personnel, and provide necessary rad-safe support (personnel decontamination center, environmental monitoring, etc.).

Environmental Monitoring. Continuous air sampling will be conducted at the boundary of the controlled area during all test operations. Water run-off will be collected in retention pits and will be sampled prior to release to the environs.

RADIOLOGICAL SAFETY TRAINING

A radiological safety training course will be presented to the military personnel assigned to the project. The course will be sufficient to familiarize the personnel with the land target studies and rad-safe procedures, as applicable.

BASIC RADIOLOGICAL SAFETY STANDARDS

The rad-safe standards will be derived from "Radiological Safety Regulations,"<sup>1</sup> of the Navy Bureau of Medicine and Surgery and from the Atomic Energy Commission "Standards for Protection Against Radiation."<sup>2</sup> The maximum permissible exposure (MPE) will be 3.0 r per 13 weeks not to exceed 5 r for the operation provided the lifetime accumulated exposure of personnel does not exceed  $(N-18) \times 5$  rem where N is the individual's age.<sup>3</sup> The maximum permissible concentration (MPC) for Lanthanum 140 air and surface contamination are taken from the Federal Register, 10 CFR Part 20. The MPC's for skin, clothing and equipment contamination are derived from the USNRDL Health Physics Division's MPC's for routine and special operations.<sup>4</sup> Table 1 tabulates the maximum permissible limits to be used in this operation.

1 NavMed P-1325 (Rev. 1951)

2 AEC Federal Register, 10 CFR Part 20, January 29, 1958

3 National Committee Radiation Protection, Statement of 8 Jan 1957

4 "Principles of Radiation and Contamination Control" Manual, Review Draft, Fall 1957, Chapter 4.

## RADIOLOGICAL SAFETY FACILITIES AND EQUIPMENT

Personnel Dosimetry. Film badges will be used to document the whole body gamma and beta exposure received by personnel participating in the land target studies. Self-reading pocket ionization chambers will also be used for monitoring the daily personnel exposure. Visitors will be issued film badges to record their radiation exposure. Special wrist film badges will be issued to measure hand exposures as necessary.

Portable Monitoring Equipment. Portable radiac equipment will be used for radiation and contamination monitoring, a Cobalt 60 source will be used to check the gamma calibration of the instruments at the test site. Table 2 lists the available radiac equipment.

Personnel Decontamination Center. A two story Army barracks at the test site will be used as a Personnel Decontamination Center and Rad-Safe Center. It will be located near the test area making it convenient for the processing of all personnel entering and leaving the test area. Standard clothing and equipment will be issued for use as protective clothing. Table 3 lists the protective clothing requirements for processing 75 to 100 personnel per day based on a 2 day laundry cycle.



4-487-5  
(L58)

TABLE 1  
TABULATION OF MAXIMUM PERMISSIBLE LIMITS

1. Personnel MPL

(a) Radiation exposure per 13 weeks

	<u>Gamma</u>	<u>Beta</u>
Whole body	3.0 r	15 rad
Hands and feet	15 r	30 rad

(b) Aerosol Activity: Occupational -  $4 \times 10^{-6}$   $\mu\text{c/cc}$   
Environmental -  $1 \times 10^{-7}$   $\mu\text{c/cc}$

(c) Food and potable water: Food and water showing any contamination will not be consumed.

(d) Water to environs - 0.1  $\mu\text{c/ml}$

	<u>MPC</u>	<u>Berkeley 2750 Contamination Meter Indication for MPC</u>
(e) Skin contamination	1,000 d/m/cm <sup>2</sup>	500 c/m

2. Clothing MPC

(a) Personal

General clothing; fixed	1,000 d/m/cm <sup>2</sup>	500 c/m
Shoes; fixed	10,000 d/m/cm <sup>2</sup>	5,000 c/m

(b) Rad-safe clothing for uncontrolled use

Coveralls; fixed	1,000 d/m/cm <sup>2</sup>	500 c/m
Gloves, hats, etc.; fixed	5,000 d/m/cm <sup>2</sup>	2,500 c/m
Shoes; fixed	10,000 d/m/cm <sup>2</sup>	5,000 c/m

(c) Rad-safe clothing for controlled use

Coveralls; fixed	50,000 d/m/cm <sup>2</sup>	25,000 c/m
Gloves, hats, etc.; fixed	100,000 d/m/cm <sup>2</sup>	50,000 c/m
Shoes; fixed	250,000 d/m/cm <sup>2</sup>	---

TABLE 1 (continued)

TABULATION OF MAXIMUM PERMISSIBLE LIMITS

	<u>MPC</u>	<u>Berkeley 2750 Contamination Meter Indication for MPC</u>
3. Equipment MPC		
(a) Final Clearance		
Fixed	10,000 d/m/cm <sup>2</sup>	5,000 c/m
Removable	5,000 d/m/12 in <sup>2</sup> wipe	2,500 c/m/12 in <sup>2</sup> wipe
(b) Operational Clearance		
Fixed	100,000 d/m/cm <sup>2</sup>	50,000 c/m
Removable	50,000 d/m/12 in <sup>2</sup> wipe	25,000 c/m/12 in <sup>2</sup> wipe
4. Radioactive Sample Shipments		
(a) Courier shipments: DOD Aircraft.		
	Gamma radiation level to be 1 r/hr at the surface of the container with removable contamination 5,000 d/m/12 in <sup>2</sup> wipe (2,500 c/m on Berkeley 2750 contamination meter).	
(b) Common carrier:		
	All radioactive shipments by common carrier to conform with ICC Regulations.	



TABLE 2

## RECOMMENDED STOCK LEVEL FOR RADIAC EQUIPMENT

4-487-5  
(258)

## 1. Contamination Meters

AN/PDR-27F	12 each
G.M. Side-window (Berkeley 2750-1)	9 each

## 2. Dose Rate Meters

AN/PDR-18	2 each
AN/PDR-T1B	2 each
Cutie Pie (EL-Tronics Model CP3DM)	6 each

## 3. Personnel Dosimeters

Film badges (DuPont film 555 and 510)	1500 each
Pocket Ionization Chambers, self-reading, 0-200 mr	75 each
Pocket Ionization Chambers, self-reading, 0-5 r	20 each
Pocket Ionization Chamber Charger	4 each

## 4. Aerosol Samplers

Portable spot aerosol samplers	6 each
Continuous constant flow suction units	4 each

## 5. Laboratory Radioassay Equipment

Scaler	2 each
Count Rate Meter, 1615-B	2 each
G.M. Detector, end-window	1 each
G.M. Detector, side-window	1 each

## 6. Miscellaneous counting standards and calibration sources.

4-487-5  
(258)

TABLE 3

PROTECTIVE CLOTHING REQUIREMENTS

<u>Item</u>	<u>Quantity Stocked</u>
Coveralls	300
Shoes	80
Socks	300
Caps	200
Hoods	50
Gloves, cotton, short	300
Gloves, cotton, rubber-dipped	50
Gloves, rubber or Neoprene, heavy	50
Gloves, rubber, Surgeons	100
Booties, plastic	300
Boots, rubber; sizes: 11, 12, 13 (16 each)	48
Shields, face	20
Masks, assault	24
Canisters, spare (for assault masks)	24
Bags, laundry	24
Shirts-T	300
Shorts	300
Towels, bath	300
Gear, foul weather (Rain Parka and trousers)	10
Suit, all plastic	4



4-487-5  
(258)

JUN 26 1958

2010

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO 24, CALIFORNIA

IN REPLY REFER  
TO FILE:

730-129

ALS:ams

JUN 1958

AIR MAIL

Isotopes Branch  
Division of Licensing and Regulation  
U.S. Atomic Energy Commission  
1717 H Street, N.W.  
Washington 25, D.C.

Gentlemen:

Reference is made to our AEC Byproduct Material License No. 4-487-3,  
Conditions 14 and 21.

Condition 14, "Byproduct material procured as sealed source shall not be opened," has caused a question to be raised by one of the Laboratory's suppliers of radioactive materials, the Phillips Petroleum Company, Materials Testing Reactor, Idaho Falls, Idaho. The Laboratory sends lanthanum-139 and fissionable materials, sealed in quartz and metal capsules, to the MTR for irradiation, producing lanthanum-140 and fission products. Upon return to the Laboratory the capsules are opened and the byproduct materials are used in the experimental program.

Our interpretation of Condition 14 is that it is not meant to exclude this type of use, and that the inclusion of byproduct materials in sealed capsules should not be construed to be sealed sources as defined by Condition 14. We would appreciate a clarifying statement so that the present existing confusion may be clarified.

An analagous situation exists in the case of irradiated units supplied by the Union Carbide Nuclear Company, Oak Ridge. These units are supplied in sealed capsules which are meant to be opened for use of the materials therein.

Condition 21, "Byproduct material shall not be used in or on human beings, products distributed to the public, or field applications," has also created a question with our isotope suppliers. The Laboratory is presently planning an experimental project entitled, "Development of the Reclamation Procedures for Land Targets." A description of this program and the radiological safety controls to be used are enclosed in a letter to you from the Bureau of Ships, Ref: J3/2 (372) Ser 372-116 of 13 June.

730-129  
ALS:ams

After review of these enclosures, your concurrence is requested that this is a controlled Laboratory use and not a field application as the term is defined in this license.

Very truly yours,

(b) (6)

Captain, USN  
Commanding Officer and Director

Copy to:  
BuShips (372)  
AEC (SFO)  
Phillips Petroleum Company  
Attn: (b) (6)



730-129  
ALS:ams

After review of these enclosures, your concurrence is requested that this is a controlled Laboratory use and not a field application as the term is defined in this license.

Very truly yours,

(b) (6)

Captain, USN  
Commanding Officer and Director

Copy to:  
BuShips (372)  
AEC (SFO)  
Phillips Petroleum Company  
Attn: (b) (6)

4-487-5  
(258)

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO 24, CALIFORNIA

IN REPLY REFER  
TO FILE:

730-129  
ALS:ams

AIR MAIL

Isotopes Branch  
Division of Licensing and Regulation  
U.S. Atomic Energy Commission  
1717 H Street, N.W.  
Washington 25, D.C.

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DEPARTMENT OF THE NAVY  
BUREAU OF MEDICINE AND SURGERY  
WASHINGTON 25, D. C.

4-487-5  
(258)  
IN REPLY REFER TO

BUMED 74: (b) (6)  
M8-2/NRDL  
Serial: 5121  
25 June 1958

Isotopes Branch  
Division of Licensing and Regulation  
U. S. Atomic Energy Commission  
1717 H Street, N.W.  
Washington 25, D.C.

Gentlemen:

By letter of 23 May 1958 to Mr. (b) (6), U. S. Atomic Energy Commission, the Commanding Officer of the U. S. Naval Radiological Defense Laboratory requested that the possession limit for Lanthanum 140 under License Number 4-487-3 be increased from 25 curies to 200 curies and enclosed abstracts "Development of Reclamation Procedures for Land Targets" and "Radiological Safety Measures for Land Target Reclamation Study".

By letter of 13 June 1958 to Division of Licensing and Regulations, U. S. Atomic Energy, the Chief, Bureau of Ships, Department of the Navy also forwarded similar request and enclosures.

The Commanding Officer, U.S. Naval Radiological Defense Laboratory has submitted the enclosed application and Supplement A- Human Use with respect to the use of Lanthanum 140 as a tracer of soil in determining the contaminability characteristics of personnel operating as combat troops. On 19 June 1958, the Secretary of the Navy approved the enclosed proposal utilizing Naval Volunteers. The Secretary of the Army has been requested to approve the utilization of Army Volunteers.

It is recommended that the enclosed application be approved.

(b) (6)

CAPT MC USN  
Director, Special Weapons  
Defense Division

Enclosures:

1. AEC Form 313- Original and two(2) varifax copies
2. AEC Form 313a-Original and two(2) varifax copies

Copy to:  
Chief, BUSHIPS  
CO & DIR NRDL  
BUMED 714C

11540





DEPARTMENT OF THE NAVY (258)  
BUREAU OF MEDICINE AND SURGERY  
WASHINGTON 25, D. C.

2617

IN REPLY REFER TO  
BUMED 742: (b) (6)  
M8-2/NRDL  
Serial: 5139  
22 July 1958

U.S. Atomic Energy Commission  
Division of Civilian Application  
Licensing Branch  
1717 H Street, N.W.  
Washington 25, D.C.

Attention: Mr. (b) (6) :

Gentlemen:

The U. S. Naval Radiological Defense Laboratory has requested authorization for the use of radiol isotopes in human volunteers. The Secretary of the Navy and the Secretary of the Army have approved the request, and a copy of their endorsements is forwarded herewith.

You have previously received from this Bureau, BUMED 74: PFD: dfp over M8-2/NRDL, Serial 5121 of 25 June 1958, U. S. Naval Radiological Defense Laboratory's application for byproduct material license to use  $Ia^{140}$  in human volunteers.

Your early review and consideration of this application will be appreciated, as the target date for the operation is 15 August 1958.

Sincerely yours,

(b) (6)

CAPT MC USN  
Director, Special Weapons  
Defense Division

Encl:  
Verifax copy BuMed's  
ltr-Serial 5123 of  
26 June 1958 with  
1st and 2nd endorsements





DEPARTMENT OF THE NAVY  
BUREAU OF MEDICINE AND SURGERY  
WASHINGTON 25, D. C.

4-487-5  
(258)

IN REPLY REFER TO

BUMED 742: (b) (6)

M8-2/NRDL

Serial: 5139

22 July 1958

U.S. Atomic Energy Commission  
Division of Civilian Application  
Licensing Branch  
1717 H Street, N.W.  
Washington 25, D.C.

Attention: Mr. (b) (6)

Gentlemen:

The U. S. Naval Radiological Defense Laboratory has requested authorization for the use of radioisotopes in human volunteers. The Secretary of the Navy and the Secretary of the Army have approved the request, and a copy of their endorsements is forwarded herewith.

You have previously received from this Bureau, BUMED 74: PFD: dfp over M8-2/NRDL, Serial 5121 of 25 June 1958, U. S. Naval Radiological Defense Laboratory's application for byproduct material license to use La<sup>140</sup> in human volunteers.

Your early review and consideration of this application will be appreciated, as the target date for the operation is 15 August 1958.

Sincerely yours,

(b) (6)

CAPT MC USN

Director, Special Weapons  
Defense Division

Encl:

Verifax copy BuMed's  
ltr-Serial 5123 of  
26 June 1958 with  
1st and 2nd endorsements





DEPARTMENT OF THE NAVY  
BUREAU OF MEDICINE AND SURGERY  
WASHINGTON 25, D. C.

4-487-5  
58  
IN REPLY REFER TO

BUMED 74: (b) (6)  
MB-2/NRDL  
Serial: 5123  
26 June 1958  
NSD/P.R.F.  
13

From: Chief, Bureau of Medicine and Surgery  
To: Secretary of the Army  
Via: Secretary of the Navy

Subj: Authorization for use of radioisotopes on volunteers, request for  
by Commanding Officer, U. S. Naval Radiological Defense Laboratory

Encl: (1) Copy of CO USNRDL, San Francisco 24, Calif. Air Mail ltr to  
SecNav, via BUMED, of 28 May 1958, same subject, with enclosures  
thereto, and copy of BUMED 1st end. thereon of 6 June 1958  
(2) Copy of CO USNRDL ltr 730-112 AIS:ams to U. S. Atomic Energy  
Commission, Div. of Civilian Application Licensing Branch,  
Washington 25, D. C. of 23 May 1958 with enclosures thereto

1. By enclosure (1), the Commanding Officer, U. S. Naval Radiological  
Defense Laboratory, requests authorization for use of radioisotopes  
(La<sup>140</sup>) on human volunteers in support of a project to be performed by  
the U. S. Naval Radiological Defense Laboratory under Department of the  
Army Project Order Allotment 99178/58, and supplies data to support this  
request.

2. Enclosure (2) contains supplementary information pertaining to procure-  
ment of La<sup>140</sup>.

3. Since it is expected that most of the volunteers involved in subject  
project will be Army personnel, it is requested that authorization be  
granted by the Department of the Army to the Commanding Officer, U. S.  
Naval Radiological Defense Laboratory to use radioisotopes on Army  
volunteers as indicated in paragraph 2 of enclosure (1).

4. Attention is invited to paragraph 6 of enclosure (1).

(b) (6)

Copy to:  
BUSHIPS, Code 348 w/o encls  
CO USNRDL w/o encls

SO 6 27 14



68-5  
29 JUN 1958

RECEIVED

FIRST ENDORSEMENT on BuMed ltr MB-2/NRDL Ser 5123 of 26 Jun 58

From: Secretary of the Navy  
To: Secretary of the Army

SECRETARY OF THE ARMY

Subj: Authorization for use of radioisotopes on volunteers,  
request for by Commanding Officer, U.S. Naval Radio-  
logical Laboratory

1. Forwarded with the request that basic correspondence be  
approved.

(b) (6)

Copy to:  
BuMed  
BuShips, Code 348  
CO USNRDL

2nd Ind.

JUL 18 1958

SUBJECT: Authorization for use of radioisotopes on volunteers, request  
for by Commanding Officer, U.S. Naval Radiological Laboratory

Department of the Army, GASA (MP&RF), Washington 25, D. C.

TO: Secretary of the Navy, Washington 25, D. C.

Authorization as requested in paragraph 3 of basic correspondence is  
granted.

*Hugh M. Milton II.*

Hugh M. Milton II.  
Assistant Secretary of the Army

OSA 700.2 6-26-58



(b) (6), Assistant Chief  
Isotopes Branch, Division of Licensing and Regulation

(b) (6), Chief, Radiation Safety Branch  
Division of Licensing and Regulation

USNRDL LA 140 - WORK AT CAMP STONEMAN

SYMBOL: DLR:CMF

#### Conclusions

The application presented in letters included with your memorandum of July 24, 1958, appears to be satisfactory from the radiological safety standpoint. In view of the strict radiological controls to be used in the test, it is suggested that any approval include an interpretation in an accompanying letter, that this is considered to be a laboratory exercise and does not constitute field application. A further note should be added to clarify that the La capsules are not considered to be sealed sources and not subject to leak test requirement or Condition 14 of the license pertaining to not opening of sealed sources.

#### Items Which Should Be Resolved

(1) Some type of respiratory protection should be used at all times that the concentrations exceed the limits in Part 20 for airborne concentrations during the contaminating, maneuvering and cleanup of the contaminated areas.

(2) The licensee should be informed that an average of 0.3 rem/wk or the 3 rem/13 weeks for the eyes and gonads will be the limiting factor for both beta and gamma exposure. Due to these lower limits, the permissible exposure to the whole body (eyes, gonads, and body) will be 3 rad beta and gamma and not 3 rad gamma and 15 rad beta as stated on Page 2, Table I of the application dated May 26, 1958. The greater dose rate, if used, will have to be approved by the Division of Biology and Medicine.

#### Material

500 curies La 140, possession limit. No more than 2 curies to be used in any one experiment.

#### Purposes of Experiments

A through D on Page 2 of V. Saitta letter of June 13, 1958.

#### Procedures

OFFICE ▶  
SURNAME ▶  
DATE ▶

La 140 will be prepared in solution for mixing with the bulk carrier material (soil) from behind a shielded concrete wall and remote control (master-slave) manipulators.				
---	--	--	--	--



(b) (6)

Page 2

The dry fallout simulant will be prepared by combining the La 140 solution and the bulk carrier material in a modified transit mix truck (cement mixer). Slurry fallout simulant will be prepared and dispersed in a modified Chemical Corporation decontamination truck.

The dry simulant will be dispersed by means of a spreader mounted on the rear of a dump truck.

Roofing areas will be contaminated by means of hand drawn dispensers.

#### Test Procedures

Put in Items 1 through 4 from Page 2.

#### Radiological Safety Procedures

Radiation monitors will be present during the preparation, dispersal and decontamination of the synthetic fallout area. The health physics group will advise the project officer on radiological safety procedures and to minimize radiation exposure to project personnel.

Continuous air sampling will be conducted at the boundary of the control area during test operations. Water run off will be collected in storage pits and will be sampled prior to release to the environs.

The military personnel assigned to the project will be instructed in radiological safety.

The test areas will be monitored to determine gamma activity before maneuvering, and the total time for maneuvering will be set short enough to assure a gamma dosage considerably below the MPE.

The radiological safety standards are based on Nav. Med. P-1325 (Rev. 1951), 10 CFR 20, 3 r/13 weeks not to exceed 5 r/operation provided the lifetime accumulated dose does not exceed (N-18 x 5 rem). The MPC for La 140 for air and water are taken from 10 CFR 20. The MPC for skin, clothing and equipment contamination are taken from USNRDL Health Physics Division's MPC's for routine and special operations.

#### Radiation Detection and Personnel Equipment

Film badges, self-reading dosimeters, Geiger Counters, count rate meters, aerosol samples, scalars, gas masks, coveralls, shoes, gloves, booties, caps.

#### Field Test

The test will consist of up to 15 test runs with 6 to 12 men/run.

OFFICE ▶	The test will include four phases.			
	1. Preparatory phase - contaminating the area.			
SURNAME ▶	2. Maneuvering phase - maneuver of troops in the area for periods up to ½ hour.			
DATE ▶				



(b) (6)

Page 3

3. Monitoring phase - detailed radiation check.
4. Dosimetry phase - films will be applied to soldiers and their clothing separately to determine the distribution of contamination. The three initial runs A, B, and C will be used to establish test conditions and to ascertain that the MPE to personnel will not be exceeded.

The maximum anticipated exposure from the "C" run for the maneuvering, monitoring and dosimetry phases for beta and gamma is 1975 mrad. The radiation dosages required for quantitative results is expected to be from 100 to 1000 millirads beta. Gas masks will be used. The filters on the ~~mask~~ masks will be given to the R.S.O. for evaluation. The R. S. O. will be present during the test runs to assess and advise the project officer on the radiological situation.

The soldiers will be surveyed after the maneuvering to determine if a prompt shower is advisable and to determine the time required for film exposure during the dosimetry period. The soldiers will not be released from the test areas before showering and radiological safety monitoring. Excretory specimens will be taken to determine magnitude of ingestion or inhalation.

#### Decontamination

An Army barracks will be used as the decontamination and health physics center. It is located near the test area. All personnel entering or leaving the area will be processed. Standard clothing and equipment will be issued for use as protective clothing.

#### Experience of Users

Messrs. (b) (6) and (b) (6) have had experience in weapons tests and, therefore, should be technically capable of carrying out a safe program. The health physicist, Mr. (b) (6) appears to have had sufficient experience to assist in the tests.

Two physicians will be available at all times for consultation.

OFFICE ▶	DLR CMT:REP:LRR:Ps	DLR				
SURNAME ▶	(b) (6)					
DATE ▶	7/31/58					



1717 H Street, N. W.

DIR/IB:DAS  
4-487-5

August 5, 1958

Mr. (b) (6)  
Chairman, Radioisotope Committee  
U. S. Naval Radiological Defense  
Laboratory  
San Francisco 24, California

Subject: BYPRODUCT MATERIAL LICENSE NO. 4-487-5

Dear Mr. (b) (6):

The enclosed license is in response to USNRDL's application dated May 26, 1958. We received the application July 2, 1958. Coordination of the request with the military groups concerned further delayed the issuance of the subject license.

Following the telephone conversation between you and our Mr. (b) (6) on August 1, 1958, a more detailed review was made of your proposed beta dose. Our more recent calculations indicate a beta half value layer for La-140 to be approximately 70 mg/cm<sup>2</sup>. Thus we agree that the La-140 maximum permissible whole body exposure for a period of 13 consecutive weeks is 15000 mrad beta.

Commander (b) (6)' letter of May 23, 1958 requested concurrence that this study be considered a controlled laboratory use and not a field application as the term is defined in License No. 4-487-3. In view of the strict radiological controls to be used in test, we consider it to be a laboratory exercise and not a field use.

OFFICE ▶					
SURNAME ▶					
DATE ▶					



Mr. (b) (6)

- 2 -

August 5, 1958

Captain (b) (6)'s letter of June 24, 1958 asked whether or not material which is sealed in a capsule and inserted in a reactor for irradiation must be considered as a sealed source upon withdrawal from the reactor. It is not our intention that the sealed source conditions (which specify that leak tests be performed periodically and the sources not be opened) be applied to material which is irradiated and intended for use in other than the sealed source form. The subject license does not include any of our standard sealed source conditions.

Very truly yours,

(b) (6)

Assistant Chief, Isotopes Branch  
Division of Licensing & Regulation

Enclosures:

1. EML No. 4-487-5
2. 10-CFR-20
3. Form AEC 313 w/instr.

OFFICE ▶	Isotopes Br	Isotopes Br				
SURNAME ▶	(b) (6)					
DATE ▶	8-5-58	8-5-58				



U.S. ATOMIC ENERGY COMMISSION  
BYPRODUCT MATERIAL LICENSE

Page 1 of 2 Pages

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee		
1. Name	U. S. Naval Radiological Defense Laboratory	
2. Address	Scientific Department San Francisco 24, California	
3. License number	4-457-5 (158)	
4. Expiration date	December 31, 1958	
5. Reference No.		
6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
Lanthanum 140	A-y	500 curies

## 9. Authorized use

To be used as a tracer in decontamination studies.

## CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.
11. Byproduct material may also be used at Camp Stoveman, Pittsburg, California.
12. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation".
13. Byproduct material shall be used by, or under the direct supervision of, (b) (6) or (b) (6).
14. The licensee shall possess and use byproduct material in accordance with the procedures represented in his application dated May 26, 1958, and as amended by:
  - A. Letter dated May 23, 1958, from the U. S. Naval Radiological Defense Laboratory, San Francisco 24, California, to USAEC with attached abstracts entitled: "Development of Reclamation Procedures for Land Targets" and "Radiological Safety Measures for Land Target Reclamation Study."

(See page 2)

For the U. S. Atomic Energy Commission

(b) (6)

Chief, Isotopes Branch

by

Division of Licensing and Regulation  
Washington 25, D. C.

Date August 4, 1958



PRODUCT MATERIAL LICENSE

Supplementary Sheet

License Number 4-437-5.  
(153)

CONDITIONS - Continued

1. - Continued

- B. Letter dated July 1, 1958, from the Department of the Navy, Bureau of Ships, Washington 25, D. C., to USAMC.
- C. Letter dated July 23, 1958, from the Department of the Navy, Bureau of Medicine and Surgery, Washington 25, D. C., to USAMC, with attached Board letter - Serial 5123 with 1st and 2nd endorsements.

For the U. S. Atomic Energy Commission

(b) (6)

the August 4, 1958

by

Chief, Isotopes Branch

Division of Licensing and Regulation  
Washington 25, D. C.



U.S. ATOMIC ENERGY COMMISSION  
BYPRODUCT MATERIAL LICENSE

Page 1 of 2 Pages

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee		
1. Name	U. S. Naval Radiological Defense Laboratory	
2. Address	Scientific Department San Francisco 24, California	
3. License number	L-437-5 (158)	
4. Expiration date	December 31, 1958	
5. Reference No.		
6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
Leuthamer 140	Any	500 curies

9. Authorized use  
to be used as a tracer in decontamination studies.

## CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.
11. Byproduct material may also be used at Camp Storms, Pittsburg, California.
12. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation".
13. Byproduct material shall be used by, or under the direct supervision of,  
(b) (6) or (b) (6)
14. The licensee shall possess and use byproduct material in accordance with the procedures represented in his application dated May 26, 1958, and as accepted by:
  - A. Letter dated May 23, 1958, from the U. S. Naval Radiological Defense Laboratory, San Francisco 24, California, to USAEC with attached abstracts entitled: "Development of Reclamation Procedures for Land Targets" and "Radiological Safety Measures for Land Target Reclamation Study."

(See page 2)

Date August 4, 1958

For the U. S. Atomic Energy Commission  
Original Signed by  
Chief, Isotopes Branch

by

Division of Licensing and Regulation  
Washington 25, D. C.



U. S. ATOMIC ENERGY COMMISSION  
BYPRODUCT MATERIAL LICENSE

Page 2 of 2 Pages

Supplementary Sheet

License Number 4-487-5  
(L53)

COMMITTEE - Continued.

14. - Continued

- B. Letter dated July 1, 1958, from the Department of the Navy, Bureau of Ships, Washington 25, D. C., to UEAEC.
- C. Letter dated July 20, 1958, from the Department of the Navy, Bureau of Medicine and Surgery, Washington 25, D. C., to UEAEC, with attached BuMed letter - Serial 5123 with 1st and 2nd endorsements.

For the U. S. Atomic Energy Commission

(b) (6)

Chief, Isotopes Branch

Date August 4, 1958

by

Division of Licensing and Regulation  
Washington 25, D. C.



In reply refer to:  
IEB:LHR

Oak Ridge, Tennessee  
August 1, 1956

Mr. (b) (6)  
Radioisotope Committee  
U. S. Naval Radiological Defense Laboratory  
San Francisco 24, California

Reference: 3-370-132 WJF:ams

Subject: APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Dear Mr. (b) (6):

Reference is made to your application concerning the use of La 140 in skin decontamination experiments which was attached to your letter of July 19 to Mr. (b) (6).

The information which you have presented for this application is satisfactory. However, revised byproduct material licensing regulations became effective on February 10, 1956, requiring that all applications submitted after that date be presented on the revised application form. We have completed a set of forms for you and request that they be signed, notarized and returned to this office so that a byproduct material license can be issued. It is our understanding that you are proceeding with your experiment on the basis of the verbal agreement Mr. (b) (6) has given and, therefore, your program is not being held up.

Thank you for your cooperation in this matter.

Very truly yours,

(b) (6)

(b) (6), Chief  
Byproduct Licensing Branch  
Isotopes Extension  
Division of Civilian Application

Enc

1. Form 313, partially completed
2. Form 313 (obsolete)
3. Form 313 w/instructions (12 sets)

Rogers:rc

	Isotopes					
VICE	(b) (6)					
	8-1-56					



U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO 24, CALIFORNIA

IN REPLY REFER  
TO FILE:  
3-730-132  
WJF:ams

6985

(b) (6)

AIR MAIL

Mr. (b) (6)  
U.S. Atomic Energy Commission  
Isotope Extension  
Oak Ridge, Tennessee

Dear Mr. (b) (6):

As per your telephone conversation on 17 July with Mr. (b) (6) of this office, the form AEC-313 has been completed and is forwarded herewith.

For purposes of record, I would like to restate here the specific details of the experiment as relayed to you during your telephone conversation with Mr. (b) (6).

The project contemplated will be entitled "The Decontamination of Lanthanum  $^{140}\text{La}$ -Contaminated Human Skin by the Use of Various Decontaminating Agents." The data to be derived from such an experiment is needed for practical use in a future NRDL field operation where multi-curie amounts of the radioisotope  $^{140}\text{La}$  in the chemical form  $\text{LaCl}_3$  will be mixed with surface soil; the  $^{140}\text{La}$  contaminated soil will have to be decontaminated from the skin of operating personnel each day for a period between four and seven weeks. The most efficient decontamination procedure of the many standard methods in routine use by laboratories in this country will only be determined by a pre-controlled experiment using the skins of volunteer human subjects. These volunteer subjects will be male members of the staff of this Laboratory and will be fully indoctrinated in all implications of the experiment prior to its taking place. A literature search has indicated no information is available which can be extrapolated in a practical way to human skin, and consultation with various experienced NRDL scientists has disclosed that use of animal skin for this type of information may yield data which is fraught with inaccuracies.

Captain (b) (6), the Laboratory's Radiological Medical Director, has been consulted in this matter and has given his approval to proceed with our contemplated project subject to AEC and Bureau of Medicine and Surgery approval. The latter will be advised of same by separate letter.



3-730-132

WJF:ams

Mr. (b) (6) has advised me that upon the basis of the information disclosed in your telephone conversation, and restated above, and in view of the isotope's characteristics (short half-life, expected innocuous effect upon the body's physiology, decay to a stable isotope, use of tracer amounts of approximately 0.5  $\mu$ c per skin area, and the fact that decontamination measures will be instituted immediately after contamination or very shortly thereafter), you have granted verbal approval of this experiment.

For your further information, the following trained physicians are members of the Laboratory staff and will be available at all times for consultation on this project:

Capt. (b) (6) (MD)(USN) is a physician trained in internal medicine.

LCDR (b) (6), PhD, MD (USNR) is a physician trained and boarded in internal medicine.

LT. (b) (6), MD (USNR) is a trained pathologist.

It is understood that written approval of this controlled experiment will be forthcoming from the AEC upon approval of the enclosed form AEC-313.

Your cooperation in this matter is greatly appreciated, especially since time is of the essence in obtaining decontamination data for the forthcoming NRDL field operation.

Very truly yours,

(b) (6)

Chairman, Radioisotope Committee

(b) (6)

Enclosure:

1) 3 cys form AEC-313



Form AEC-313  
(Rev. March 1951)  
B. B. No. 38-R027.1

APPLICATION FOR RADIOISOTOPE PROCUREMENT

FOLLOW ATTACHED INSTRUCTIONS

LEAVE BLANK

TO: U. S. ATOMIC ENERGY COMMISSION, POST OFFICE BOX E, OAK RIDGE, TENNESSEE, ATTENTION: ISOTOPES DIVISION

1. NAME AND ADDRESS OF APPLICANT (Institution, Firm, etc. Follow Instruction No. 2A)

(b) (6), Chairman, Radioisotope Committee

U.S. Naval Radiological Defense Laboratory, San Francisco 24, Calif.

2. DEPARTMENT TO USE ISOTOPE  
(Follow Instruction No. 2B)

Health Physics

3. NAME AND ADDRESS OF INDIVIDUAL USER (Follow Instruction No. 3A)

a) (b) (6) Principal Investigator  
b) (b) (6)

4. EXPERIENCE OF THE USER (Follow Instruction No. 3B)

a) 6 years as Health Physicist; 2 at Argonne National Lab.; 4 at NRDL; trained in biology and chemistry.

b) 6 years experience with radioisotopes: 6 yrs as Chemical Engr, 2 at NRDL

6 years as Health Physicist, NRDL  
RADIOISOTOPE REQUESTED (Follow Instruction No. 4)

5. ISOTOPE (Element and mass number)

Lanthanum 140

6. CHEMICAL FORM

LaCl<sub>3</sub>

7. QUANTITY (Millicuries or irradiated units)

35 to 50  $\mu$ c

8. OTHER SPECIFICATIONS

Fixed in special California surface soil.

9. ITEM NO. (If any) IN U. S. AEC CATALOG

10. NAME AND ADDRESS OF SUPPLIER, IF KNOWN

Materials Test Reactor

Phillips Petroleum Company, Idaho Falls, Idaho

STATEMENT OF USE (Follow Instruction No. 5)

11. STATE PROPOSED USE OF RADIOISOTOPE AND GENERAL PLAN OF INVESTIGATION

a) A 2-10 curie bombardment yielding La<sup>140</sup> is regularly scheduled for receipt at NRDL about every 2 weeks for use in preliminary laboratory studies on surface soil and on experimental animals. An aliquot of this sample, expected on 17-18 July, 1956, will be given the applicants for use in this experiment.

b) The isotope will be deposited on a 10 cm<sup>2</sup> skin area of human volunteer subjects in 0.5  $\mu$ c amounts on the hand and/or forearm. Contamination level to be expected, as measured by a Nuclear-Chicago Model 1615B instrument with a thin end-window tube of approx. 15% geometry, will be in the order of 15,700 c/m. Immediately after contamination the skin area will be decontaminated by one of various standard decontamination methods and data tabulated.

12. WILL THE RADIOISOTOPE BE USED IN HUMAN BEINGS? (Follow Instruction No. 6A) Externally only CIRCLE YOUR ANSWER

YES

NO

13. A. HUMAN DOSAGE  
(In millicuries per patient)

5 x 10<sup>-4</sup> to  
3 x 10<sup>-3</sup> mc

B. NUMBER OF DOSES  
(Per patient)

1 to 3 of 0.5  $\mu$ c  
each.

C. NUMBER AND TYPE OF PATIENTS

12 to 20 volunteers;  
50% military, 50%  
civilian.

D. COMPOUND ADMINIS-  
TERED

E. SAMPLE TO BE TAKEN FOR  
MEASUREMENT

Activity on skin  
before and after  
decontamination.

14. APPROVAL OF THE USER'S LOCAL ISOTOPE COMMITTEE (Follow Instruction No. 6B)

"THE LOCAL ISOTOPE COMMITTEE APPROVES THE HUMAN USE AS INDICATED IN ITEMS 11-13."

(Signature of Chairman, Local Isotope Committee)

15. WILL THE RADIOISOTOPE BE USED IN LOWER ANIMALS?

CIRCLE YOUR ANSWER

YES

NO

16. IS A COMPLETED FORM AEC-313A A PART OF THIS APPLICATION? (Follow Instruction No. 7)

CIRCLE YOUR ANSWER

YES

NO

Is not required per telcon w/ (b) (6) on 17 July 56.

17. MAY THE ISOTOPES DIVISION RELEASE GENERAL INFORMATION REGARDING MATERIAL USED AND PURPOSE?

(If your answer is "No," please state your reason here)

CIRCLE YOUR ANSWER

YES

NO

Classification at present is Official Use Only

READ THE TERMS AND CONDITIONS ON THE BACK OF THIS SHEET AND SIGN THE CERTIFICATE  
THAT FOLLOWS—AN UNSIGNED APPLICATION CANNOT BE CONSIDERED



## TERMS AND CONDITIONS

In consideration of the issuance of an authorization from the Commission to enable the applicant to procure or obtain the radioisotopes or irradiation service requested hereon, the applicant agrees that:

1. Radioisotopes purchased or acquired from the Commission or a distributor are shipped f. o. b. the laboratory, plant, facility, or Commission office handling the transaction, at prices and service fees as fixed by the Commission, and title to said materials, if same are not already owned by the applicant, shall pass to the applicant when the materials are delivered to the carrier. When shipment of the materials requires the use of returnable Government-owned containers, title to such containers shall remain in the Government and a deposit to insure return of the containers will be made if required. The applicant will keep the containers in good condition, will not use them for any materials other than the materials shipped therein, and will return them to point of shipment, transportation prepaid, within 21 days of date of shipment.
2. Neither the Government, the Commission, nor any distributor will be responsible for:
  - (a) any damage to, destruction to, loss of, or changes in physical or chemical properties of materials of any kind accepted for a service irradiation, either as a result of, or in the process of, the irradiation or while said materials are in the possession of the Commission or a distributor;
  - (b) any injury to persons or other living things or for damage to property caused by handling, shipment, use (including use based on any statement of quality or quantity), storage, transfer, disposal, or reshipment of, or other act or failure to act in connection with any materials purchased or acquired from the Commission or a distributor, or procured from any source upon the Commission's approval, it being expressly agreed that, as between the Commission, the supplying distributor, and the applicant, the applicant assumes complete responsibility and liability for any such injury or damage occurring: Provided, however, That if such injury or damage is caused solely by the negligent packing of the Commission or a distributor this assumption of liability shall not apply.
3. Neither the Government, the Commission, nor any distributor makes any warranty or other representation that (a) materials accepted for a service irradiation will not be destroyed, damaged, or otherwise altered in physical or chemical properties in the process of irradiation, and (b) radioisotopes (1) will not result in injury or damage when used for the purposes approved by the Commission, (2) will accomplish the results for which they are requested and approved by the Commission, (3) are safe for any other use, or (4) are of a particular quality or quantity. When procuring radioisotopes from the Commission or a distributor the applicant agrees to report promptly whether the amount received represents the amount paid for, in order that discrepancies may be adjusted.
4. Neither the Government, the Commission, nor any distributor shall be responsible, irrespective of cause, for the failure of the Commission, and distributor, or other transferor to (a) deliver radioisotopes at specified times, or (b) deliver radioisotopes of specified quality.
5. When materials supplied for a service irradiation are:
  - (a) from an applicant not authorized to possess or use radioisotopes, the Commission or the distributor shall have the right to retain possession and control of the irradiated materials throughout the period of measurable activity of such materials, and unless otherwise stated in the request for service irradiation, may dispose of such materials in accordance with

the usual Commission or distributor disposal procedures for radioactive materials;

- (b) to be tested or analyzed and retained by the Commission or a distributor, such materials may, unless otherwise stated in the request for service irradiation, be disposed of in accordance with the usual Commission or distributor disposal procedures for radioactive materials.

It is expressly agreed that if any irradiated materials covered by (a) or (b) above must be retained by the Commission or a distributor in order to protect health and minimize other hazards to life or property, the applicant will pay all storage and maintenance charges connected therewith, and if any irradiated materials belonging to the applicant are disposed of under the provisions of this paragraph, the applicant shall have no claim for the value or replacement of said materials.

6. The Commission shall have the right to publish and use any information or knowledge acquired as a result of the irradiation of materials furnished by the applicant, including results of tests and analyses made for the applicant in connection with any such irradiated materials.
7. The right to revoke or cancel, with or without cause, arrangements for or agreements for the purchase or acquisition of any radioisotopes from a distributor, including arrangements or agreements for service irradiations, is reserved to the Commission. In the event the Commission revokes or cancels any arrangement or agreement for a service irradiation, the Government, the Commission, and the distributor shall be discharged of all obligations thereunder by return to the applicant of an amount of nonirradiated material of like kind, quality, and quantity as the material accepted for irradiation.
8. Title to and possession of all radioisotopes purchased or acquired from the Commission or from a distributor, or from any source on the authorization or approval of the Commission, remain subject to the Commission's statutory right to recall. Title to any materials recalled by the Commission shall vest in the Commission with the exercise of this right, and the Commission may enter and take possession of said materials any time after notice is given that the materials are being recalled: Provided, That if requested, the applicant, at his expense, will make shipment of the recalled materials to a destination designated by the Commission.
9. The applicant agrees to indemnify the Government, the Commission, their officers, agents, contractors, distributors, servants, and employees against liability, including costs and expenses incurred, for infringement of any Letters Patent occurring in the course of any service irradiation, test, or analysis performed for the applicant by the Commission or its distributors, or occurring in the utilization by the applicant of any radioisotopes or irradiated materials.
10. The applicant will furnish to the Isotopes Division six copies of each article published on the results of his investigations using radioisotopes or irradiation services, or will upon request furnish to the Isotopes Division a report of the results of his investigations.
11. Any radioisotopes received as a consequence of this application will be dealt with in accordance with all instructions, recommendations, or standards issued by the Commission for the safe use, handling, or disposal of radioactive materials.
12. All purchase orders and agreements for procuring radioisotopes are subject to the terms and conditions hereof and any contrary conditions of sale or transfer contained in such purchase orders or agreements will not apply.

## CERTIFICATE

The applicant and any official executing this application in behalf of the applicant certify that the information stated herein is true and correct, that this application is made under and in conformity with Code of Federal Regulations, Title 10, Atomic Energy, Part 30, Radioisotope Distribution, and agree that this application and any materials procured pursuant thereto are subject to the terms and conditions on this page.

18 July 1956

(Date)

(b) (6)

(Signature of Applicant or Certifying Official)

Member, Radioisotope Committee

for: (b) (6)

(Title)

WARNING

Chairman, Radioisotope Committee

18 U. S. C., Sec. 1001; act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.



HR:GAB

Oak Ridge, Tennessee  
November 19, 1956

Mr. (b) (6)  
U. S. Naval Radiological Defense Laboratory  
San Francisco, California

Subject: PROPOSED VISIT

Dear Mr. (b) (6)

As you know, the program of radiological protection as administered by the Isotopes Extension of the Atomic Energy Commission, includes routine visits to institutions licensed to possess byproduct material. I should like to visit with you on Monday, December 3, 1956, to review the radiological protection aspects of this program.

During this visit I would like to include all of your facilities utilizing byproduct material, whether doing so under a license or authorization. Also, at this time any problems of a licensing nature can be discussed.

Please advise me at your earliest possible convenience if the time of my proposed visit is not satisfactory for you.

Very truly yours,

(b) (6) Assistant Chief  
Radiological Safety Branch  
Isotopes Extension  
Division of Civilian Application

AIR MAIL

Blancjrmj

OFFICE ▶	Isotopes					
SURNAME ▶	(b) (6)					
DATE ▶	11/19/56					



File

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO 24, CALIFORNIA

IN REPLY REFER  
TO FILE:  
3-252-324  
GB:gb

15 OCT 1956

Isotopes Extension  
Division of Civilian Application  
U. S. Atomic Energy Commission  
Post Office Box E  
Oak Ridge, Tennessee

Gentlemen:

(b) (6) 10/19/56  
Please forward 500 copies of Isotope Order Blank, Form  
AEC-375(1-56), to the following address:

Commanding Officer and Director  
U. S. Naval Radiological Defense Laboratory  
San Francisco 24, California

Bldg. 815  
Attn: Logistics Support Division  
Code 3-252

Very truly yours,

(b) (6)

Head, Logistics Support  
Division  
By direction of the  
Commanding Officer  
and Director



(b) (6)

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO 24, CALIFORNIA

IN REPLY REFER  
TO FILE:

5-900-694

POT:mjc

4 MAY 1955

Dr. (b) (6)  
Director, Isotopes Extension  
Division of Civilian Application  
U. S. Atomic Energy Commission  
Oak Ridge, Tennessee

Dear (b) (6):

Your letter of 16 April concerning new material  
regarding the use of radio-isotopes in radiobiology  
was referred to our Biological and Medical Sciences  
Division. I am enclosing the material which they  
have gotten together for you. Hope you find it useful  
in preparing your paper for the Congress in Mexico City.

Sincerely,

(b) (6)

Scientific Director

(b) (6)

Encl:  
(1) List of Enclosures



P.S. Thanks for your note letting me know the whereabouts of  
(b) (6) She was one of my favorite dates in college.  
Incidentally, I did manage to look her up the last time  
I was in Washington.

(b) (6)



## NUCLEAR RADIATION BRANCH

The Nuclear Radiation Branch, headed by Dr. (b) (6) is primarily responsible for research in Nuclear Radiation Physics. The Branch is currently engaged in four general programs of research in nuclear radiation problems. These are: The Radiation Characteristics program, headed by Dr. (b) (6), whose primary responsibility is a study of the nuclear radiations produced by nuclear weapons; the Shielding program, headed by Dr. (b) (6), whose research encompasses a study of the fundamental nature of shielding processes; the Solid State physics program, headed by Mr. (b) (6), whose research studies nuclear radiation effects on the properties of matter; and the Radiological physics program, headed by Mr. (b) (6), whose research concerns itself primarily with problems of the physical measurement and interpretation of nuclear radiation dosage, and which works relatively closely with the NRDL Bio-Medical Division on associated problems. Some of the research carries a security classification. However, there is a considerable quantity of research which is unclassified. Research investigators are encouraged to publish the results of their unclassified research in appropriate scientific journals and to present papers at scientific meetings. Publications from the Nuclear Radiation Branch over the past two years are:

Howland and Kreger, Phys. Rev. 95, 407 (1954).  
R. A. Meyer, J. Applied Phys. 25, 1369 (1954).  
Kreger and Cook, Phys. Rev. 96, 1276 (1954).  
W. E. Kreger, Phys. Rev. 96, 1554 (1954).  
Alger and Jordan, Phys. Rev. 97, 277 (1955).  
E. Tochilin, Am. J. Roentgenol. 73, 265 (1955).  
E. Tochilin et al, Radiation Research 4, 158 (1956).  
Howland, Scofield and Taylor, Nucleonics 14, No. 6, 50 (1956).  
Tochilin, Shumway and Kohler, Radiation Research 4, 467 (1956).  
Mather, Taylor and Cook, Nucleonics 14, No. 8, 69 (1956).  
Meyer, Bouquet and Alger, J. Applied Phys. 27, 1012 (1956).  
C. S. Cook, "Phase Change For Reflected Radiation", Am. Jour. Phys. (in press).  
Cook and Tomnovec, "Gamma Radiation from Co<sup>56</sup> and Co<sup>58</sup>", Phys. Rev. (in press).

Papers which have been presented by Nuclear Radiation Branch personnel at scientific meetings during 1956 include:

Cook and Tomnovec, Paper H8 at New York meeting of Am. Phys. Soc.  
R. L. Mather, Paper J8 at Washington meeting of Am. Phys. Soc.  
Cook and Tomnovec, Paper F7 at Eugene meeting of Am. Phys. Soc.  
Tochilin and Shumway, Abstract 104 of 1956 meeting of Radiation Research Society, Chicago, May 1956.  
Ross and Tochilin, "Simplified Fast Neutron Film Dosimeter", Health Physics Society, Ann Arbor, Michigan, June 1956.  
Kreger, Bolotin and Edelsack, Paper E7 at Chicago APS meeting.  
R. L. Mather, Paper C6; C. S. Cook, Paper C7; Tomnovec and Mather, Paper C8; Anderson and Alger, Paper F3; Alger, Drahnann and Anderson, Paper F4; F. M. Tomnovec, Paper M12; and Drahnann, Anderson and Alger, Paper S2 at Monterey meeting of Am. Phys. Soc.



December 10, 1956

All sources used at this lab are leak tested on a six months basis as required by the proposed leak test procedures.

3. The NRDL laboratories will be described in the application.

In addition to these facilities a <sup>cave</sup> ~~room~~ is presently being constructed. This ~~room~~ is for a 1000 curie Co-60 source. It has approximately 36" cement walls. The source will be manipulated with American Machine and Foundry #8 overhead manipulators. The facility has been designed for a radiation level of  $< 2$  mr/hr on the ~~room~~ wall outer surfaces.

A second 1000 curie source will be procured. It will be used in an irradiation unit.

All areas, laboratories, etc., are labeled and posted.

All personnel in the NRDL building are film badged.

4. All experimenters monitor themselves and survey their own facility. In addition the H.P. group routinely surveys all labs on an approximate weekly basis.

At present bio assays are performed only when they deem it necessary because of a particular experiment. They are set up to do routine assays on all persons should the situation dictate.

h. 5. This program has a very strong H.P. group over looking all phases of the activity. All conditions of the license and regulations are complied with.

OFFICE ▶					
SURNAME ▶	(b) (6)				
DATE ▶					



December 10, 1956

(b) (6)

VISIT TO U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY, SAN FRANCISCO,  
CALIFORNIA - ALL DEPARTMENTS - DECEMBER 3, 1956

Visited Mr. (b) (6), Chairman Isotopes Committee  
Mr. (b) (6), Head, Health Physics Section

General Authorization - Post license Repeat

1. A complete description of the administrative control procedures and radiological protection practices will be submitted by Mr. (b) (6) with the application for a license. Briefly it is as follows:

All material (byproduct) is requested on an isotope order form which is submitted through a committee man to the H. P. group. The H. P. group reviews the application and gives O.K. then goes to (b) (6) who, if satisfied signs it. The isotope request is then ordered by the H.P. group through the Purchasing Department. At the same time a card is made out on the isotope, quantity, etc., and placed on file. The card then becomes the control on that isotope. All isotopes are received by H.P. opened, monitored, and delivered when needed. If it is to be stored the H.P. department stores and has it under control until the user is in need of it.

All movement, transfer, or disposal of the isotope is kept on the card. Every piece of paper on the use of that isotope is kept as permanent files.

2. This organization is responsible for disposal of radioactive wastes from many government laboratories in this area. The material from NRDL is packaged into 55 steel drums, concrete weighted, and shipped out to sea. The area used for disposal has been designed by the Navy as the area for disposal of toxic chemical wastes and radioactive wastes. The area is chiefly 55 miles S.W. of San Francisco, in which the depth uniformly exceeds 1000 fathoms. A description of the procedures is to be submitted with the application.

No material is disposed into the sewer.

OFFICE ▶					
SURNAME ▶					
DATE ▶					



5/4/56

# EVALUATION AND RECOMMENDATIONS

Institution: U. S. Naval Radiological Defense Lab, San Francisco, California  
 Address: \_\_\_\_\_  
 Category: General (b) (6)  
 RSB Representative: \_\_\_\_\_  
 Date of Visit: December 3, 1956

Type of License	Pre-licensing	Reviewed by
Limited _____	First _____	(b) (6) (b) (6)
Broad _____	Repeat _____	Licensing _____
Comprehensive _____	Post-licensing	
General _____	First _____	
	Repeat <u>X</u>	
	Special _____	

Conditions: Satisfactory; Marginal; Unsatisfactory; Not Applicable (S, M, U, NA)

- |                                    |                                      |
|------------------------------------|--------------------------------------|
| I. <u>S</u> Administrative Control | IV. <u>S</u> Personnel Monitoring    |
| II. <u>S</u> Material Licensed     | <u>S</u> Radiation Survey Procedures |
| <u>S</u> Disposal                  | <u>S</u> Controlled Areas            |
| III. <u>S</u> Lab Facilities       | <u>S</u> Non-controlled areas        |
| <u>S</u> Shielding                 | <u>S</u> Radiation Signs             |
| <u>S</u> Equipment                 | V. <u>S</u> Records                  |
| <u>S</u> Instrumentation           | VI. <u>S</u> Regulations             |
|                                    | VII. <u>S</u> Terms and Conditions   |

Critical Evaluations: (Summary of over-all program, discussion of specific marginal and unsatisfactory conditions with recommendations for corrective action.)

Recommended that they semi-permanently label all waste barrels including those received from the other labs.

Yes \_\_\_\_\_ Revisit is Recommended: (When) 1 year.

Letter of Recommendation Sent to: \_\_\_\_\_  
 (Date) \_\_\_\_\_

Letter of Compliance Received From: \_\_\_\_\_  
 (Date) \_\_\_\_\_



U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY  
SAN FRANCISCO 24, CALIFORNIA

9675  
~~15~~  
IN REPLY REFER  
TO FILE:

3-941-281  
CSC:led  
15 NOV 1956

*No Reply*  
**(b) (6)**  
*Files*

Dr. **(b) (6)**  
Isotopes Division  
Atomic Energy Commission  
Box 3  
Oak Ridge, Tennessee

Dear Dr. **(b) (6)**:

We are currently looking for a fairly senior man for our radiological physics research program. This has been caused by the fact that one of our senior men will be leaving us around the middle of 1957. Several years ago he formed a partnership from which a private corporation has been formed to do consulting and other types of services in the field of radiological physics for various organizations in our part of the country. His company has grown to the extent that he feels that it will soon be necessary for him to devote his full time to its problems.

The radiological physics research program is one of four in the Nuclear Radiation Branch, two of the others being in nuclear physics and the third in solid state in which studies are made of the effects of nuclear radiations on solids. The radiological physics program also is relatively closely associated with the biological research of various groups in our Bio-Medical Division. To provide you with some additional information regarding our research programs I am enclosing a sheet which briefly describes these programs and lists the papers which we have published in the various professional journals during the past two years, and papers which we have presented at society meetings during the past year. While these cover the entire branch, you will note that three of the journal papers are from the radiological physics program and two of the meeting presentations are from this group.

Although my description of our research is quite brief, I wonder if you might possibly have some suggestion as to one or more possible candidates for our group. Should you know of anyone who feels he might be interested but would like to have additional information, I shall be very happy to attempt to provide this for him.